Re-heart Transplantation in a patient with primary graft failure

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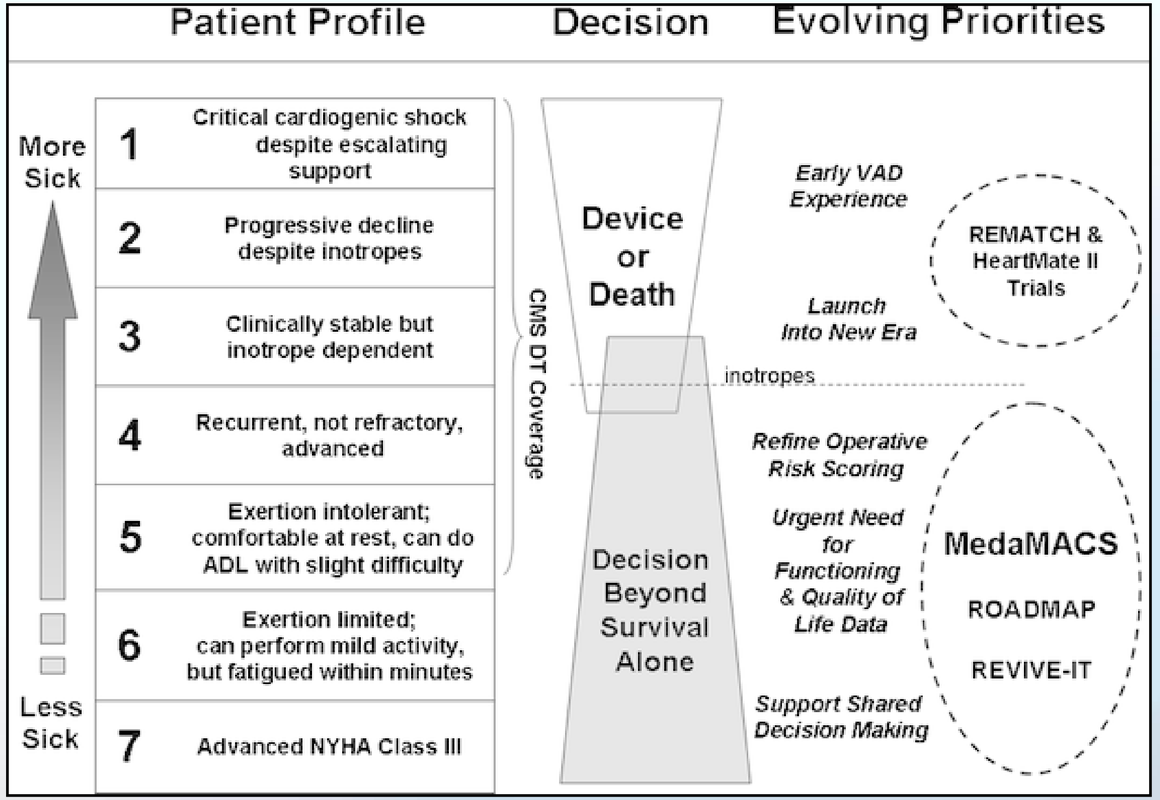
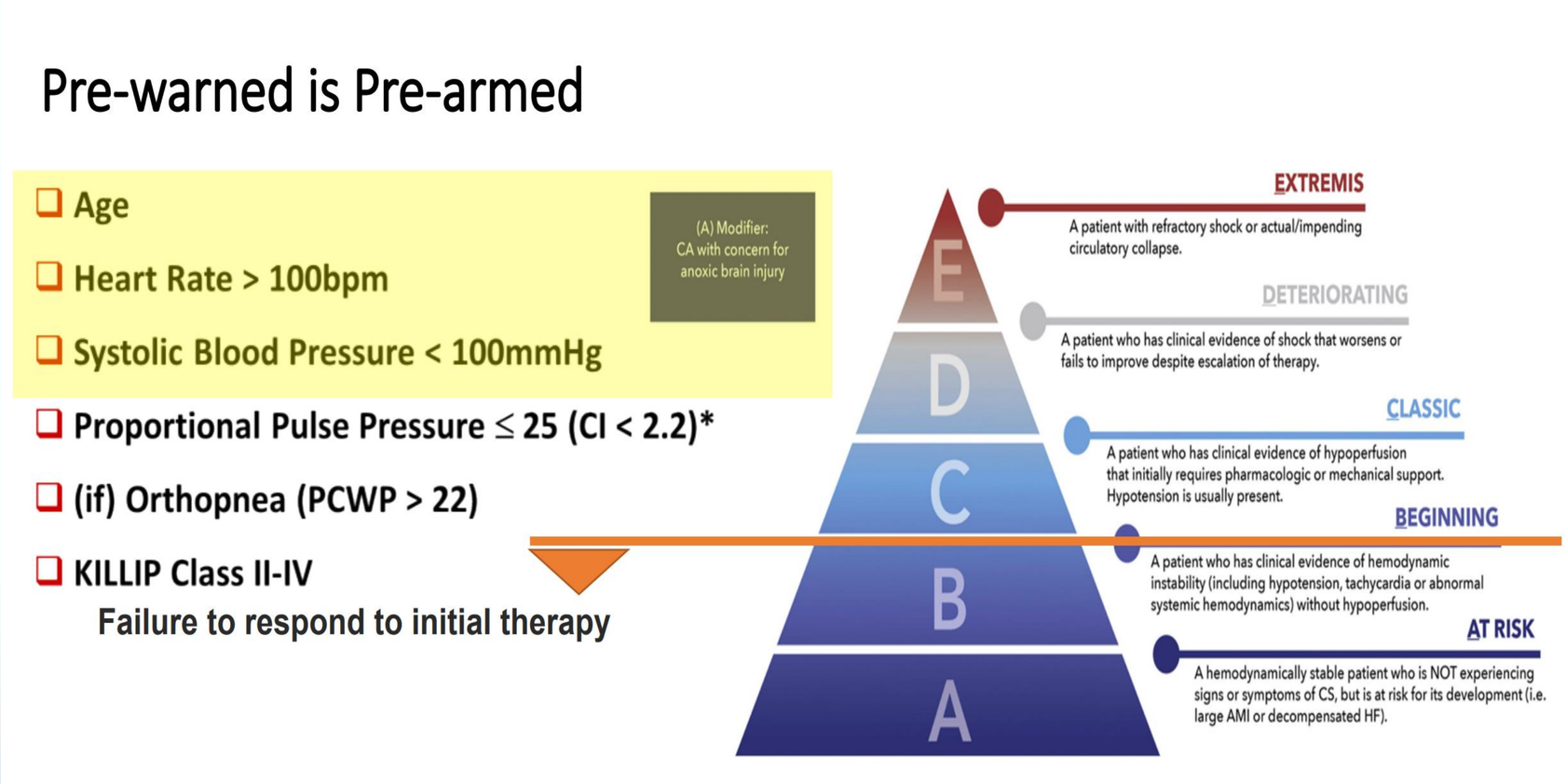
Case presentation

- 35-year-old male
- Idiopathic Dilated Cardiomyopathy (5 years)
- Dyspnea, Fatigue , weight loss and dizziness
- TTE: Biventricular enlargement, LVEF:10-15 %
- Cr:1.6 mg/dl, Lactate : 2.5 mmol/L
- tMCS, Heart Transplant waiting list

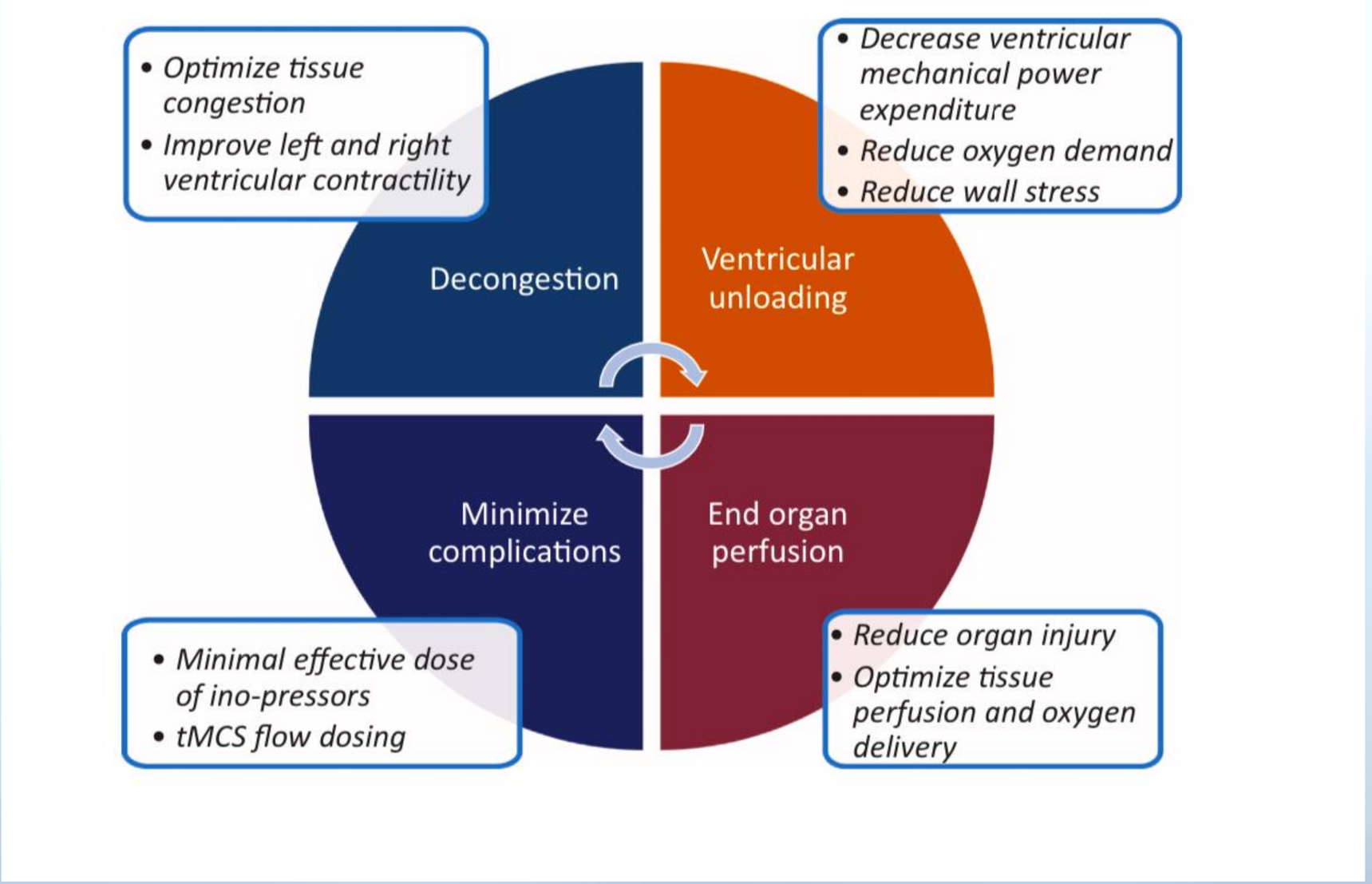


Right Heart Catheterization

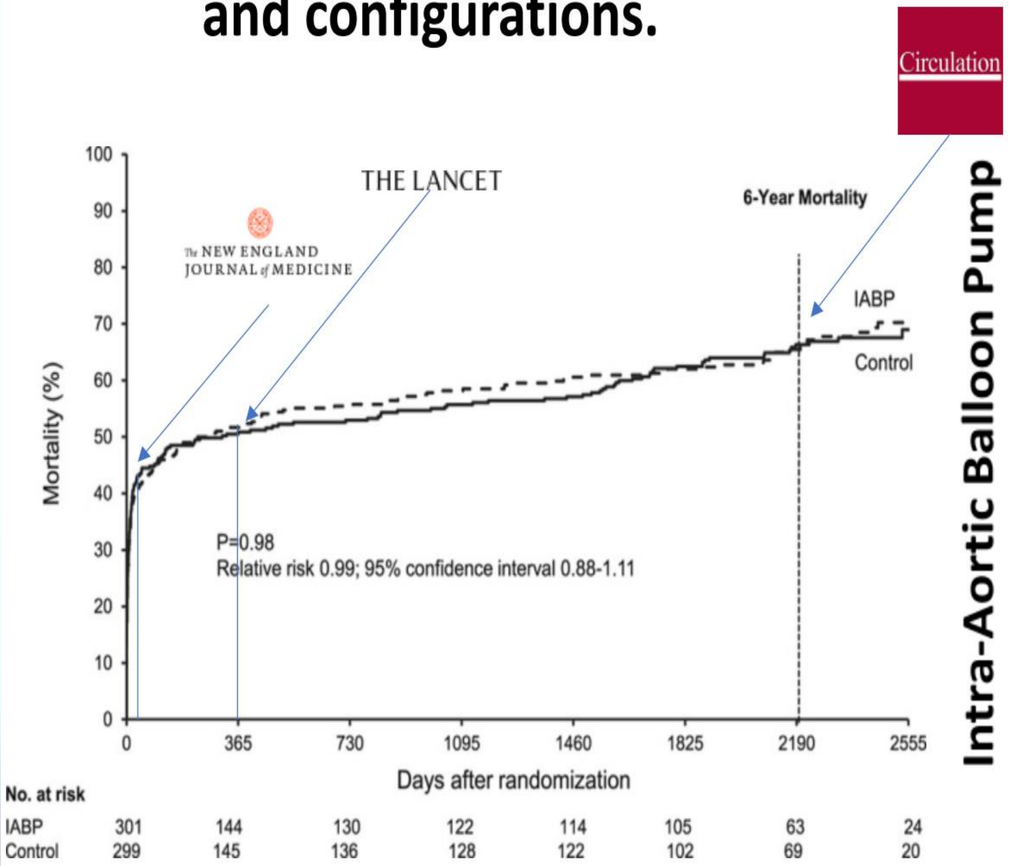
- CO: 2.3 lit/min
- CI:1.2 lit/min/m2
- PCWP: 25 mmHg
- RA pressure : 12 mmHg
- PAP : 48/30 (mPAP: 36) mmHg
- pressure : 50/ 5-15 mmHg
- MVO2 sat : 33 %
- PVR : 4.7 woods
- SVR: 25 woods



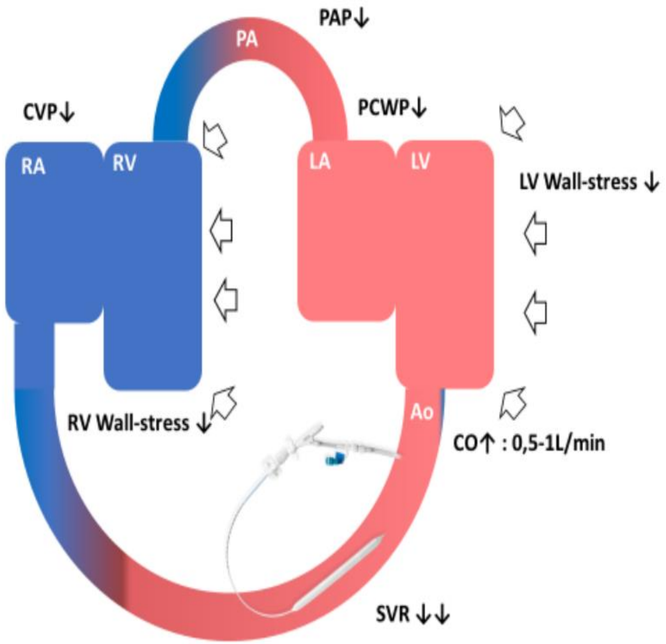
Goal of tMCS


• Optimize tissue congestion
• Improve left and right ventricular contractility
• Decrease ventricular mechanical power expenditure
• Reduce oxygen demand
• Reduce wall stress
Decongestion
Ventricular unloading
Minimize complications
End organ perfusion
• Minimal effective dose of ino-pressors
• tMCS flow dosing
• Reduce organ injury
• Optimize tissue perfusion and oxygen delivery

Temporary MCS): types and configurations.

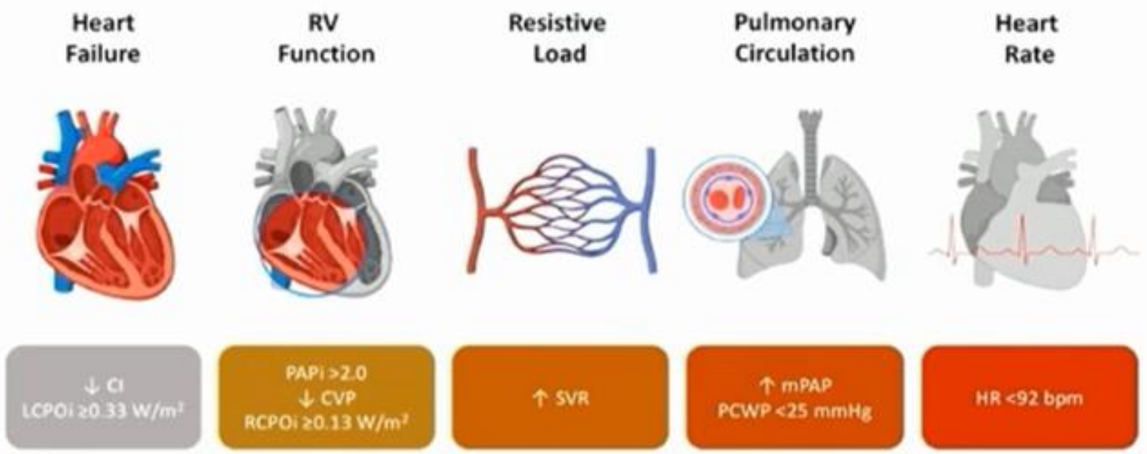


Intra-Aortic Balloon Pump



DOI: 10.1056/NEJMoa1208410
DOI: 10.1016/S0140-6736(13)61783-3
DOI: 10.1161/CIRCULATIONAHA.118.038201

IABP Responders in Acute Heart Failure



Larger capacity (50-cc) IABP

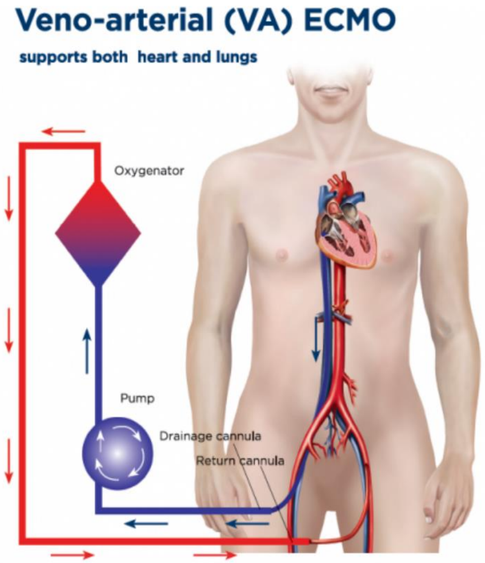
- ✓ ⇧ augmented diastolic pressure
- ✓ ⇧ magnitude of diastolic augmentation
- ✓ ⇧ slope and magnitude of deflation pressure from peak augmented diastolic pressure to reduced aortic end-diastolic pressure

50-cc IABP but not 40cc IABP

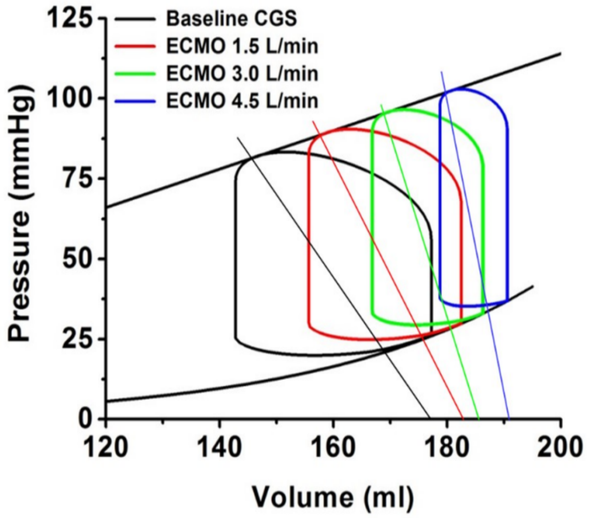
- ✓ ⇩ PCW
- ✓ ⇧ CO, cardiac index & mixed oxygen saturation
- ✓ ⇧ CO = 1.4 ± 1.0 L/min with 50-cc IABP vs. 0.7 ± 0.9 L/min with40-cc IABP or relative CO increase of 40% vs. 18%

- Patient underwent Heart Transplantation
- In OR , TEE showed severe biventricular dysfunction
- He transferred to ICU with central ECMO
- TTE: almost No contractility
- Methylprednisolon, ATG
- Norepinephrine, Milrinone

- **Cardiac (or cardiopulmonary) support**
- **Percutaneous, rapid access**
- **Awake or ventilated**
- **Up to 8L/min – high, stable flow, 2-4 weeks**

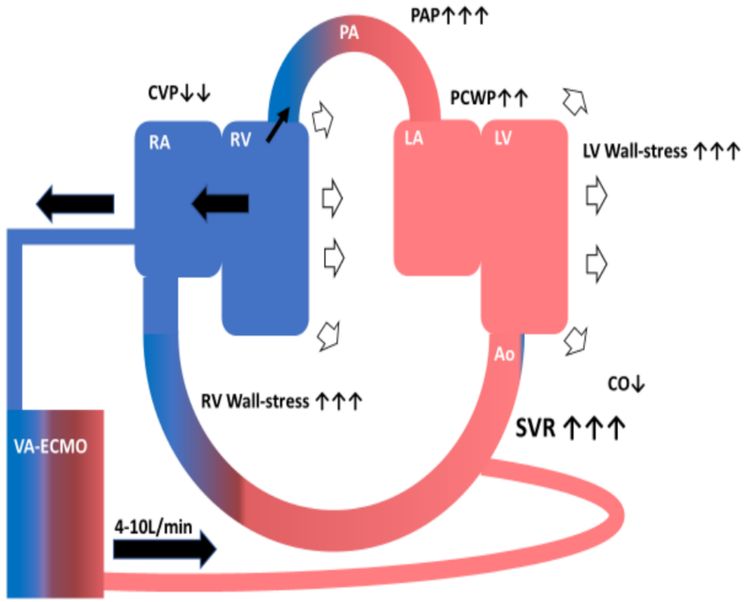


tMCS: types and configurations.



↑ LVEDP (≈ flow) ↑ Ea, ↓LV stroke volume (≈ flow): ↓width of the PV loop [= volume difference between end-systolic and end-diastolic volumes.]

Venoarterial Extracorporial Membrane Oxygenation



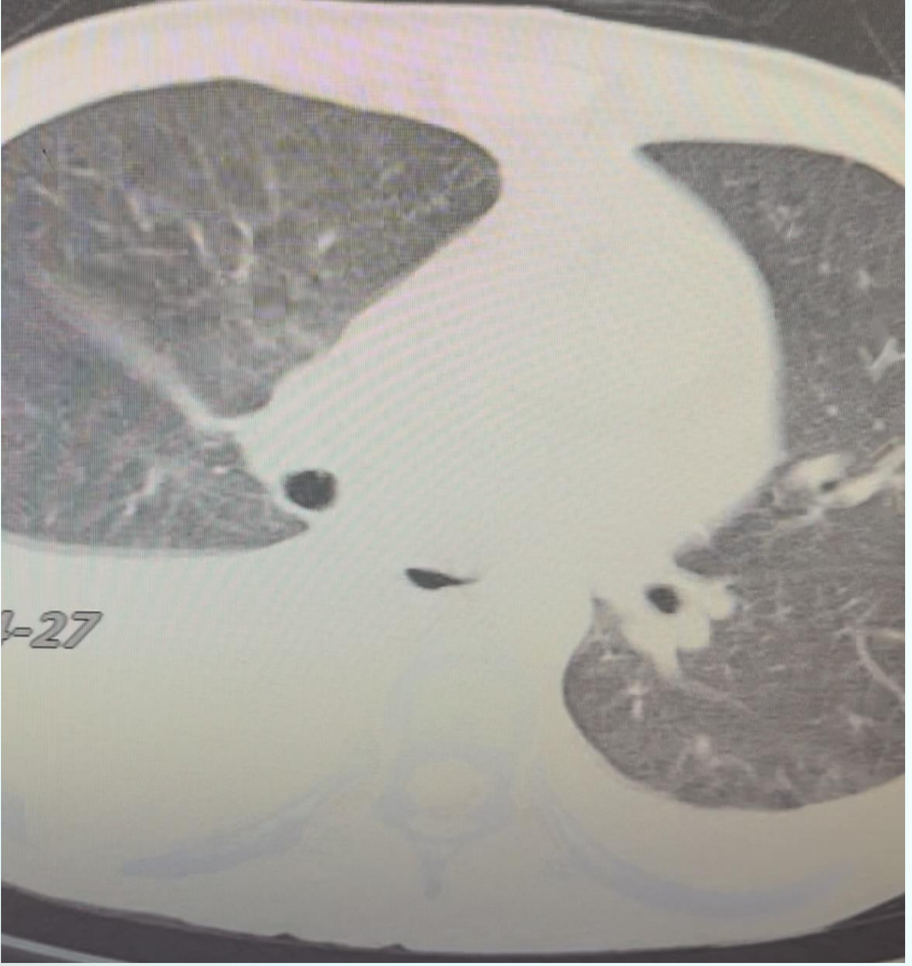
Circulation. 2023;147(6):454-64.

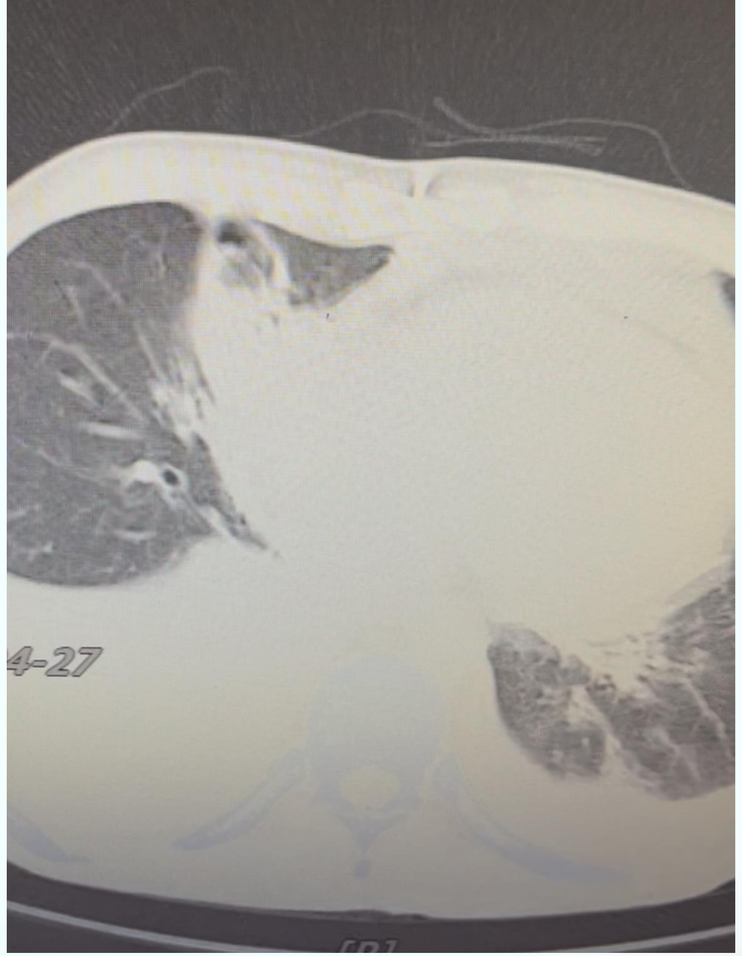
Re-Transplantation

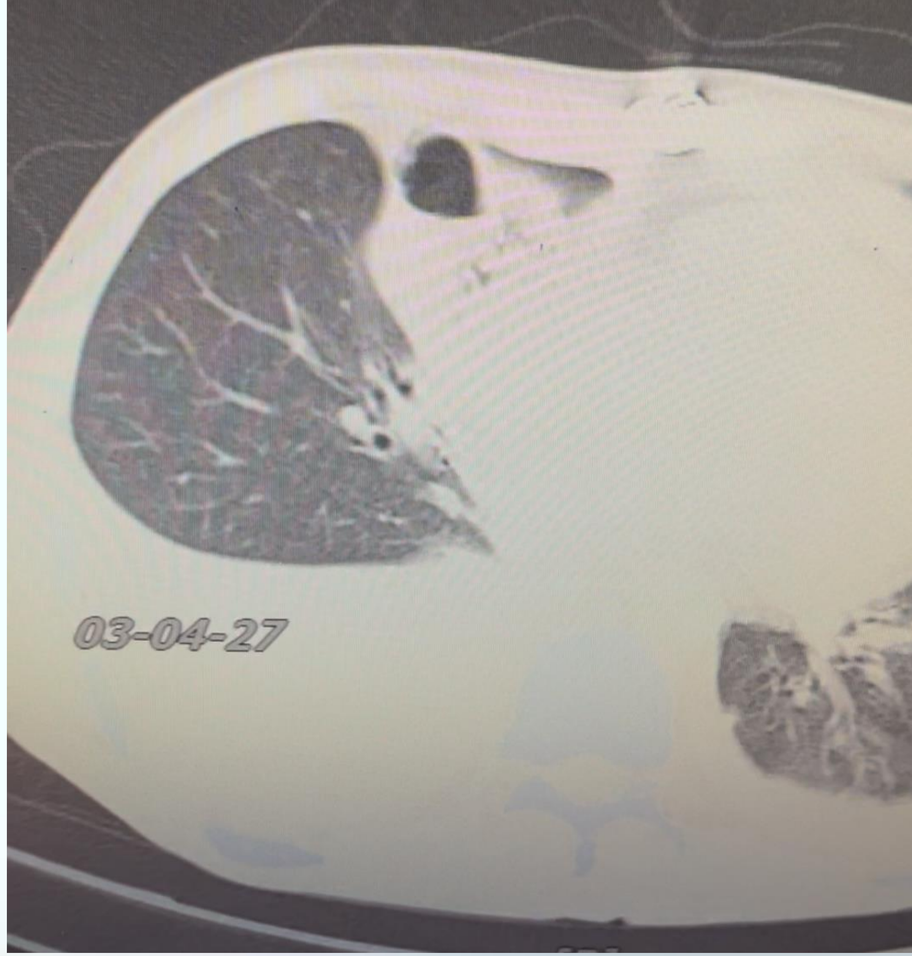
- After 4 days , he underwent Re-Heart transplantation
- Histopathological analysis was in favor of primary Graft Dysfunction
- TTE: LVEF : 55%, mild RV enlargement and dysfunction
- Methylprednisolon, ATG , Cellcept, Prograf
- AKI , CRRT

Re- Tansplantation

- 100-120 cases annually worldwide (2-4 %)
- Graft failure , Rejection , CAV
- Inferior outcome
- More sensitized
- PGF most common in first month , CAV after the first year
- No difference in the use of induction immunosuppression







Bronchoscopy and BAL : Aspergillosis

PCT : 23 ng/ml , Galactomannan (BAL) : 10 .5 mg / dl

Caspofungin , voriconazole

RHC and EMB

- CI: 2.8 lit/min/m2
- PAP: 30/15 mmHg
- RA pressure : 3 mmHg
- PCWP: 12 mmHg

- EMB : Grade 0-1R

PGD

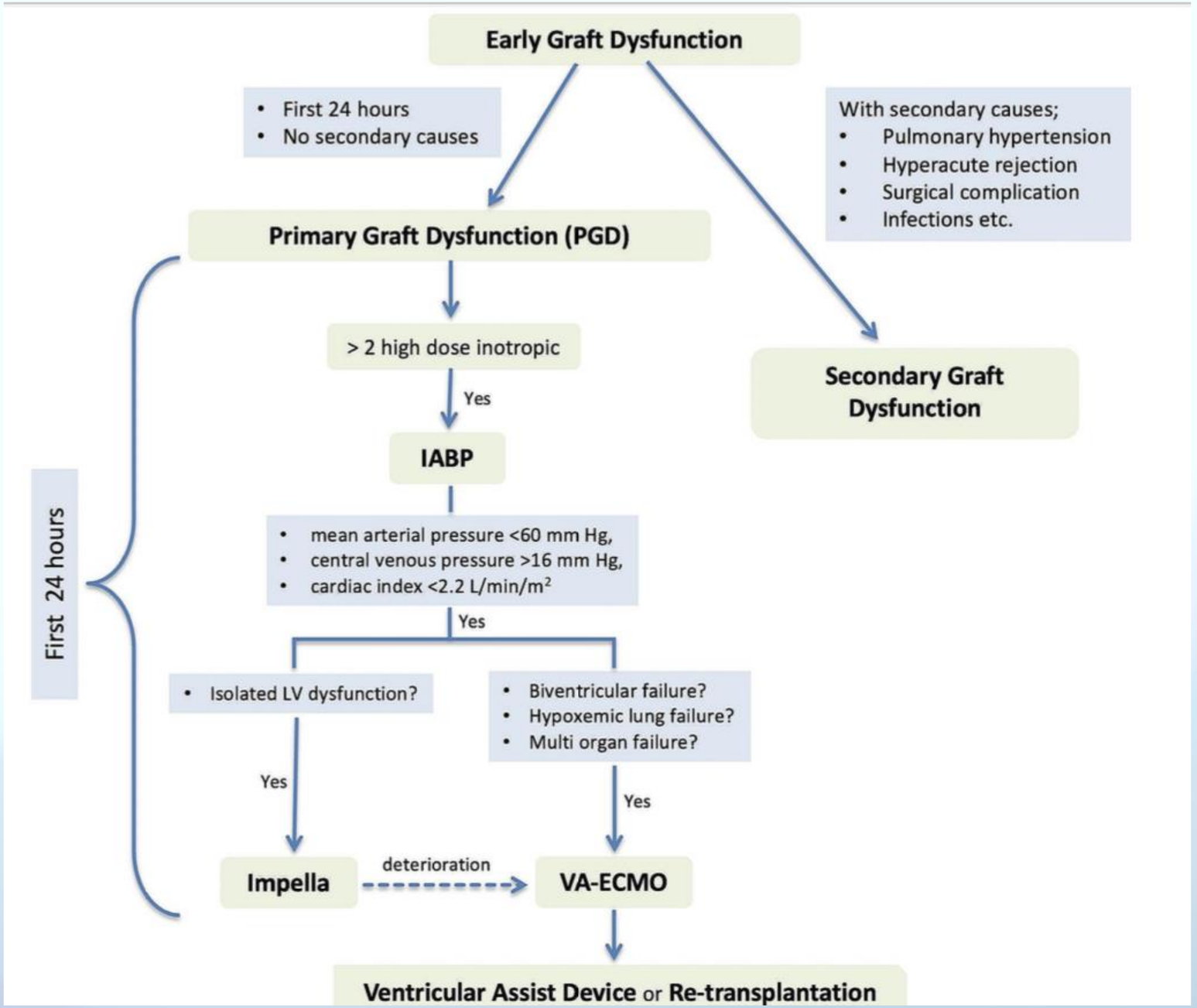
-PGD is defined as graft dysfunction caused by severe ventricular dysfunction within the first 24 h following donor graft transplantation

-Hyperacute Rejection, Pulmonary Hypertension, Surgical complication

PGD-LV	**Mild**	**One of the following criteria:** • LVEF ≤ 40% by echocardiography, or • Hemodynamics with RAP > 15 mm Hg, PCWP > 20 mm Hg, • CI < 2.0 L/min/m2 (lasting more than 1 h) requiring low-dose inotropes
	Moderate	**One criterion from 1 and one criterion from 2**: **1. Criteria** • LVEF ≤ 40%, or • Hemodynamic compromise with • RAP > 15 mm Hg, PCWP > 20 mm Hg, CI < 2.0 L/min/m2 • Hypotension with MAP < 70 mm Hg (> 1 h) **2. Criteria** • High-dose inotropes: Inotrope score > 10 or • Newly placed IABP (Regardless of inotropes)
	Severe	**Dependence on left or biventricular mechanical support including;** • ECMO, LVAD, BiVAD, or percutaneous LVAD
PGD-RV	**Diagnosis requires either both 1 and 2, or 3 alone**: 1. Hemodynamics with RAP > 15 mmHg, PCWP < 15 mmHg, CI < 2.0 L/min/m2 2. TPG < 15 mmHg and/or sPAP < 50 mm Hg, or 3. Need for RVAD	

Donor Factors	Recipient Factors	Procedural Factors
• Older Age	• Older Age	• Long ischemic time
>20 years	• High weight	• Long CPB time
• Gender mismatch	• Mechanical support	• Weight mismatch
Female donor/male recipient	VAD/ECMO	Low weight donor heart
• Cause of death	• Congenital heart disease	• Heart team experience
- Intracranial hemorrhage	• Re-sternotomies	• Center volume
• High inotropic requirements	• Comorbidities	• Massive blood transfusion
-Noradrenaline	-Renal/Liver dysfunction	• Emergency transplant
• Cardiac dysfunction	• Ventilator dependence	
• Comorbidities (DM, HT)	• Multiorgan transplant	
• Left ventricular hypertrophy	• Elevated PVR	
• Drug abuse	• Infection	
• Infection	• Retransplant	
	• Amiodarone use	

CPB, cardiopulmonary bypass; **DM**, diabetes mellitus; **ECMO**, extracorporeal membrane oxygenation; **HT**, hypertension; **PVR**, pulmonary vascular resistance; **VAD**, ventricular assist device


Early Graft Dysfunction
First 24 hours
No secondary causes
With secondary causes;
Pulmonary hypertension
Hyperacute rejection
Surgical complication
Infections etc.
Primary Graft Dysfunction (PGD)
Secondary Graft Dysfunction
> 2 high dose inotropic
Yes
IABP
First 24 hours
mean arterial pressure <60 mm Hg,
central venous pressure >16 mm Hg,
cardiac index <2.2 L/min/m²
Yes
Isolated LV dysfunction?
Biventricular failure?
Hypoxemic lung failure?
Multi organ failure?
Yes
Yes
Impella
deterioration
VA-ECMO
Ventricular Assist Device or Re-transplantation

After 9 month of transplantation

TTE: LVEF 55 %, Normal RV size and function

Last EMB (1403.11.7) : Grade 0-1 R(Quilty effect)