



Introduction

Ventricular function assessment is important to determine if the patient is able to wean from ECMO. The weaning process may take hours and conventional TEE may not always be available. We have been utilizing miniaturized hTEE for ECMO weaning in our ICU.

Methods

Study period: October 2011 to June 2012

ECMO weaning trial N=21 (M 13, F 8)

Age: 49 ±12 years

Duration of ECMO: 11.2 ± days

Status at ECMO placement:

Salvage procedure	7 (33%)
Emergent procedure	6 (30%)
Urgent procedure	8 (40%)

Indication for ECMO:

Acutely decompensated CHF	10 (48%)
Acute myocarditis	3 (14%)
Acute myocardial infarction	3 (14%)
Postcardiotomy syndrome	2 (9.5%)
Pulmonary embolism	1 (4.8%)
PEA code	1 (4.8%)
Acute rejection	1 (4.8%)

Imacor hTEE probe

A miniaturized TEE probe.

FDA approved for use up to 72 hours.

Real time monitoring -

Direct visualization of intravascular volume and cardiac function.

No need of anesthesia or sedation.



Prerequisites for ECMO weaning

- Stable BP, HR on ECMO optimal flow
- Clinically euvolemic
- End-organ function recovered or treated
 - Liver, kidney, brain, metabolic
- Pulmonary edema resolved on x-ray
- Adequate systemic PaO2 on Vent FiO2 50%, and ECMO FIO2 50%

Monitoring : EKG, A-line, hTEE

Central line for inotrope infusions

PTT: 60-70 sec

Oral insertion of the hTEE probe

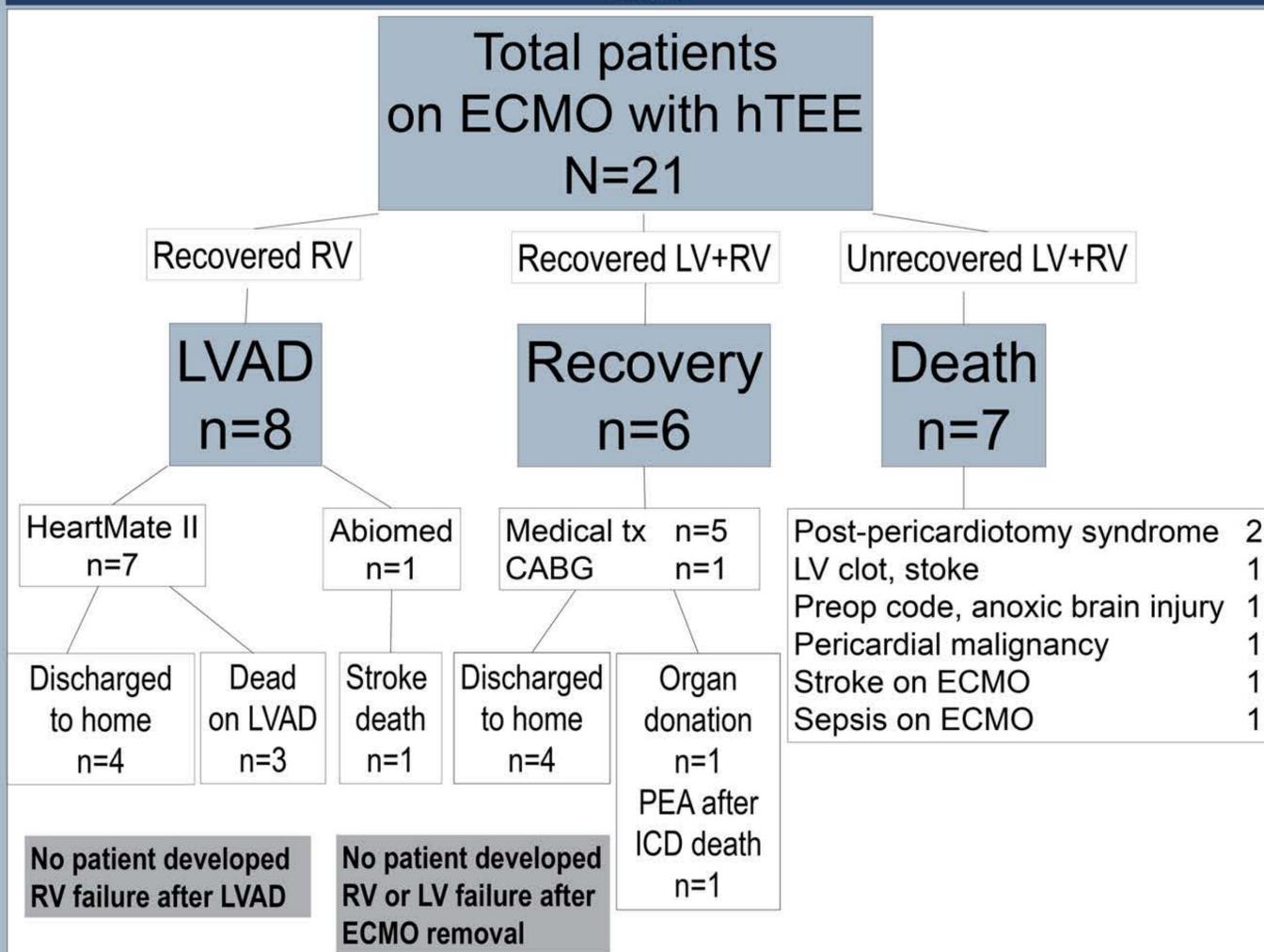
hTEE weaning protocol

- Baseline imaging: LV and RV function with full ECMO flow
- Decrease flow from full to half flow in increments of 0.5 l/min and assess LV and RV function by hTEE over at least 1/2 hour after each decrease. If distention occurs, return to full flow and abort trial.
- Volume load (10cc/kg) over 20 minutes, with half flow and assess RV and LV function by hTEE over at least 1 hour.
- Load inotrope (dobutamine and/or milrinone), decrease flow to minimum (1-1.5/min) and assess LV and RV function at least 1 hour.

Post weaning assessment

- If both ventricle recover
ECMO removal
 - If RV recovers but LV dysfunction
Implantable LVAD
 - If LV recover but RV dysfunction
External RVAD
 - If both ventricle are dysfunctional
Consider external biventricular device
Consider terminal care
- After weaning, return to full flow and discuss timing of surgical intervention.

Results



Conclusions

The hTEE-guided ECMO weaning protocol accurately predicted the ability to successfully wean ECMO to decision.



Contact information

Hitoshi Hirose, MD, Ph D.
Hitoshi.Hirose@jefferson.edu

Associate Professor of Surgery
Division of Cardiothoracic Surgery
Thomas Jefferson University