A study for Bridge to Lung Transplantation with Extracorporeal Membrane Oxygenation

-How far can the bridge to lung transplantation be expanded?-

Tomo. Yoshizumi, G. Sunagawa, S. Brann, S. Keshavamurthy, V. Dulam,
J. Gomez-Abraham, M. Kashem, K. Minakata, N. Shigemura, Y. Toyoda.

Cardiovascular Surgery, Temple University Lewis Katz School of Medicine, Philadelphia, PA, USA

Background

- There is growing evidence to justify the safety and utility of bridging strategies with ECMO in lung transplantation.
- However, most of these reported analyses pertain only to those recipients who survived lung transplantation and thus introduce a selection bias.
- Appropriate recipient selection remains to be clarified.

Aim of the study

- In this study, we focused on the patients who were placed on ECMO as a bridge to transplantation but did not survive prior to transplantation, and aimed to identify the predictive factors for mortality on ECMO as a bridge to lung transplantation.

Patients and Methods

- Study period: Feb 2012 – June 2017
- Total 325 lung transplants performed at Temple University Hospital during this period

- **Group A (n=17)**: patients who were successfully bridged with ECMO to transplantation
- **Group B (n=20)**: patients who did not survive with ECMO prior to transplantation

- Our current recipient selection criteria for ECMO as a bridge to transplantation:

Absolute contraindication… Age>75, other organ failure, neurological impairment, severe decondition

Patient characteristics @ ECMO support

		Group A (N=17)	Group B (N=20)	P=
	Age @ ECMO initiation	54.8±13.9	61.8±11.5	0.103
	Sex Male, n (%)	7 (41)	9 (45)	0.815
	BSA, n (%)	1.8±0.3	1.8±0.3	0.977
Diagnosis	IPF, n (%)	14 (82)	15 (75)	0.588
	PAH (%)	2 (12)	1 (5)	0.452
	COPD (%)	0	2 (10)	0.180
	BOS (%)	1 (6)	1 (5)	0.906
	Other (%)	0	1 (5)	0.350
Indication for ECMO	Hypoxemia, n (%)	13 (76)	10 (50)	0.093
	Hypercapnia, n (%)	2 (12)	4 (20)	0.498
	Mixed, n (%)	2 (12)	4 (20)	0.498
	Circulatory collapse, n (%)	0	2 (10)	0.180
Comorbidity	HTN, n (%)	9 (53)	11 (55)	0.9
	HLD, n (%)	10 (59)	4 (20)	0.015
	DM, n (%)	4 (24)	3 (15)	0.51
	CAD, n (%)	3 (18)	6 (30)	0.38
	CRF, n (%)	1 (6)	1 (5)	0.91

		Group A (N=17)	Group B (N=20)	P=
RHC data before listing	CVP (mmHg)	8±7	6±5	0.332
	mPAP (mmHg)	34±17	31±14	0.689
	PVR (wood units)	3.7±1.3	5.8±5.6	0.189
Type of initial device	Single-cannula VV ECMO	9 (53)	12 (60)	0.666
	VA ECMO	1	2	0.647
	PRA	2.5	14.1	0.048
	LAS @ listing	73.7	61.7	0.164
	Urgent listing (%)	11 (64.1)	9 (45)	0.231
	Days on vent before ECMO initiation	9.2	11.9	0.745
	Days for bridging to Tx w/ ECMO (days)	17 (0-91)	28 (3-95)	0.397
	Days for bridging to Tx w/ ECMO ≥10days (%)	8 (47)	16 (80)	0.036
	Weaning off from vent after ECMO intiation (%)	7 (41)	11 (55)	0.402

IPF: Idiopathic pulmonary fibrosis, PAH: Pulmonary artery hypertension BOS: Bronchiolitis-obliterans Syndrome, HLD: Hyperlipidemia, CAD: Coronary artery disease CRF: Chronic renal failure, PVR: Pulmonary vascular resistance, PRA: Panel reactive antibody, LAS: Lung allocation score

Complications during pre-Tx ECMO support

	Group A (N=17)	Group B (N=20)	P=
Complications during ECMO support, n (%)	5 (29) Multiple oxygenator clotting: 1 Bleeding: 4	14 (70) Bleeding: 9 Infection: 2 ECMO failure: 2	0.014
Cause of death during ECMO support		Sepsis: 8 Multiple organ failure: 8 Neurologic complication: 2 ECMO failure: 1 Withdrawal care: 1	

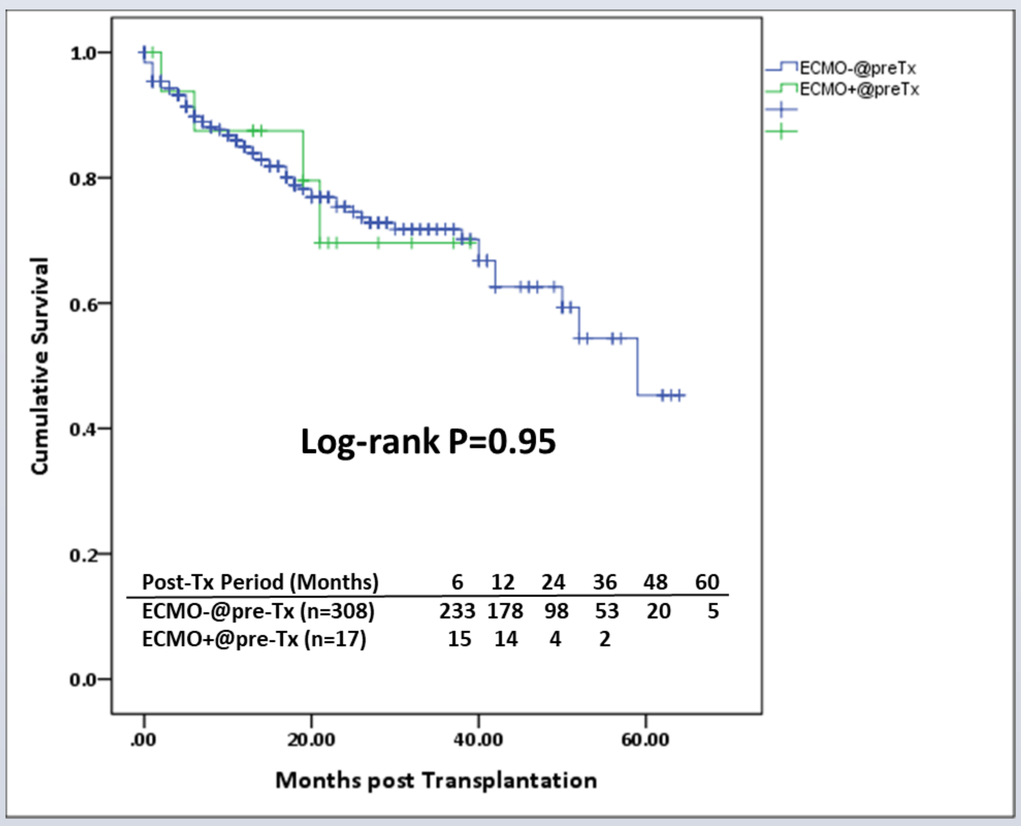
Intraoperative demographics for Group A

		Group A (N=17)
Incision	Thoracotomy, n (%)	11 (65)
	Clamshell, n (%)	6 (35)
Intraoperative mechanical pulmonary/circulatory support	VV ECMO, n (%)	2 (12)
	VA ECMO, n (%)	1 (6)
	Cardiopulmonary bypass, n (%)	14 (82)
	Double lung transplantation n, (%)	17 (100)

Postoperative demographics for Group A

	Group A (N=17)
In-house mortality s/p LTx n, (%)	2 (12)
Postoperative length of ICU stay (days)	24.9 (7-165)
Postoperative length of hospital stay (days)	46.7 (17-165)
Requirement of ECMO after lung transplantation n, (%)	2 (12)

Long-term outcome after Lung Transplantation



Conclusions

- High PRA and ECMO-related complications such as bleeding can be possible risk factors for mortality on ECMO as a bridge to lung transplantation.
- However, the patients who survived on ECMO appear to have yielded the acceptable long-term outcomes following lung transplantation.
- Further detailed analyses of risk factors for mortality are warranted to improve outcomes for those patients with high clinical acuity who are bridged with ECMO to lung transplantation.

Relevant Financial Relationship Disclosure Statement

- No relationship of disclose