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performed. 69.2% in men, with an average age of 44 years (range 25 to 61 years). From symptoms onset, average intubation time was 12.9 days, and connection to ECMO was, on average, at 12.3 days, (range 2 to 28 days). Transplants were on average at 85.5 days from the connection to ECMO (range 52 to 167). Mean was BMI was 28.3 kg/m<sup>2</sup> (range 24.4 to 35.5). One patient had previous comorbidity (arterial hypertension). Before transplantation, 100% were connected to ECMO, none of them were sedated, 11 achieved standing, 3 of which kept walking, and 53.8% maintained spontaneous ventilation. Transplant surgical approach used was Clamshell in 11 patients and median sternotomy 2. Intra-operative cannulation was performed in 100%, being veno-venous in 2 and veno-arterial in 10 of them. 61.5% of the cases (8 patients) remained on ECMO after surgery, for an average of 6.6 days (0 to 22). 61.5% of the patients had complications, being bleeding, vascular stenosis, infections, and kidney failure are described. Overall survival was 53.8% (7 patients) with a median follow-up of 64 days. The 30-day survival rate was 75%. Average time to discharge was 44.6 days after transplantation, with total average time of hospitalization of 142 days (74 to 257).

**Conclusion:** Transplantation is considered as part of the therapeutic arsenal in those patients who have confirmed irreversibility of lung damage, despite medical support. However, the delay in transplantation and the consequent connection to prolonged ECMO is observed consistently in our countries, probably due to a low rate of organ donation. This exhibits the need for a better assessment on when to perform the transplant, considering the low donor rate of lung transplant programs in Latin American countries.

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**Racial Disparities in Death Due to SARS-CoV-2 in the United States: An Analysis of the OPTN Database**

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**Purpose:** Racial disparities in severe acute respiratory syndrome coronavirus 2 (COVID) incidence and mortality have been demonstrated in the United States (U.S.). Transplant recipients represent a particularly vulnerable population given their comorbidities and immunosuppression. With this in mind, we aimed to evaluate the relationship between race and mortality due to COVID in lung transplant recipients.

**Methods:** Adult lung transplant recipients in the U.S. were identified using the Organ Procurement and Transplantation (OPTN) database. Multiorgan transplants and patients transplanted after December 31, 2020 were excluded. Recipients who were deceased or lost to follow-up prior to January 2020 were excluded as they were not at risk for death due to COVID. Lung transplant recipients were stratified by race (Black, Hispanic, White, and other race). Death due to COVID was the primary outcome while all-cause mortality and non-COVID mortality were secondary outcomes. Student's t-test, Chi-square test, and Cox proportional hazards models were used for comparisons.

**Results:** 17,198 recipients met inclusion criteria (1,598 Black, 1,353 Hispanic, 13,755 White, and 492 other race). 231 (1.34%) deaths due to COVID were reported. COVID mortality rate was significantly different ( $p=0.001$ ) by race, being lowest in White recipients ( $n=162$  [1.18%]) and highest in Hispanic recipients ( $n=30$  [2.22%]). Non-COVID mortality was lowest in Hispanic recipients ( $n=129$  [9.53%]) and highest in Black recipients ( $n=236$  [14.77%];  $p=0.008$ ). There was no significant difference in all-cause mortality ( $p=0.054$ ). After adjustment, Hispanic (HR=2.18;  $p=0.005$ ) recipients experienced higher rates of mortality due to COVID compared to whites, but no significant difference in Black recipients (HR=1.73;  $p=0.066$ ). See table 1 for additional predictors of death due to COVID.

**Conclusion:** Racial disparities in death due to COVID persist in U.S. lung transplant recipients, despite adjusting for social determinants of health.

**Table 1: Cox Proportional Hazards Regression for Mortality Due to COVID-19**

Variable	Univariate		Multivariate			
	HR	p-value	HR	Std. Error	p-value	95% Confidence Interval
White	1	.	1	.	.	.
Black	1.72	0.042	1.73	0.516	0.066	0.963 3.105
Hispanic	2.75	<0.001	2.18	0.607	0.005	1.265 3.764
Other	1.04	0.946	1.19	0.709	0.770	0.370 3.826
Age at Follow-Up in Years	1.05	<0.001	1.03	0.013	0.020	1.005 1.056
BMI	1.09	<0.001	1.05	0.024	0.030	1.005 1.101
Diagnosis						
Idiopathic Pulmonary Fibrosis	1	.	1	.	.	.
COPD/ Emphysema	0.55	0.017	0.67	0.187	0.147	0.384 1.154
Cystic Fibrosis	0.19	0.001	0.53	0.424	0.427	0.110 2.543
Other Pulmonary Fibrosis	1.07	0.822	1.01	0.303	0.977	0.560 1.818
Hypersensitivity Pneumonitis	0.55	0.317	0.66	0.395	0.491	0.207 2.130
Sarcoidosis	0.70	0.494	0.82	0.453	0.712	0.274 2.424
Alpha 1 Antitrypsin Deficiency	0.57	0.342	1.22	0.740	0.739	0.374 4.003
Primary Pulmonary Hypertension	0.82	0.696	1.50	0.816	0.461	0.513 4.356
Other	0.40	0.005	0.60	0.208	0.143	0.307 1.186
Education Level						
High School or Less	1	.	1	.	.	.
Attended College/ Technical	0.70	0.103	0.76	0.172	0.218	0.483 1.181
Associate/ Bachelor's Degree	0.52	0.013	0.58	0.156	0.044	0.345 0.985
Graduate Degree	0.50	0.062	0.50	0.193	0.074	0.237 1.069
Public Health Insurance	1.35	0.102	1.02	0.196	0.928	0.698 1.484
U.S. Citizen	0.37	0.011	0.59	0.264	0.236	0.242 1.418
Dialysis at Follow-Up	2.03	0.224	2.13	1.091	0.142	0.777 5.811
Steroid Use at Follow-Up	0.83	0.366	0.84	0.182	0.420	0.549 1.284
Pre-Transplant Pulmonary HTN	1.44	0.430	1.58	0.308	0.019	1.077 2.314
Bilateral Lung Transplant	0.36	<0.001	0.41	0.082	<0.001	0.272 0.601
Donor Age in Years	1.02	0.003	1.02	0.007	0.016	1.003 1.030
Donor History of Diabetes	1.65	0.079	1.41	0.417	0.241	0.793 2.520

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**Comparing Outcomes of COVID-19 vs NonCOVID-19 Lung Transplant Recipients on ECMO as a Bridge to Transplant**

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**Purpose:** Despite advances in treatments for COVID-19, a subset of patients develop end stage lung disease, necessitating lung transplantation. However, COVID-19 ARDS often requires prolonged intubation with sedation and paralytics, resulting in profound deconditioning. As such, extracorporeal membranous oxygenation (ECMO) is a useful bridge to transplant to allow for a wakeful state and facilitate rehab. This study compares outcomes among patients with COVID-19 and nonCOVID-19 lung disease placed on ECMO as a bridge to transplant.

**Methods:** All patients on veno-venous ECMO prior to lung transplantation at a single center from Jan 2020 - Oct 2021 were identified. Patient characteristics and post-transplant outcomes were abstracted for comparison.

**Results:** A total of 7 patients were identified in the COVID-19 (C) cohort and 11 in the nonCOVID-19 (NC) cohort. Age and LAS at transplant were similar (Table 1). As expected, total duration on ECMO was longer for C cohort patients (85.4 vs 14.5 days). Patients in the C cohort had longer ischemia times and more returns to the OR within 72 hours of transplant (71% vs 45%). Rates of hemodialysis within 30 days of transplant were lower in the C cohort (14% vs 18%). Further, C cohort patients had higher rates of detectable donor specific antibodies by IgG (71% vs 55%), though all were negative by C1q and compatible cross matches. While total and ICU lengths of stay were longer in the C cohort, this group had a shorter

post-transplant hospital length of stay. Median time post-transplant was 212 days for the C cohort and 154 days for the NC cohort; survival was 100% for both groups at follow up.

**Conclusion:** For patients with COVID-19 ARDS, ECMO is a useful bridge to transplant to mitigate complications associated with prolonged mechanical ventilation. These preliminary data suggest prolonged periods of ECMO pre-transplant do not result in significant adverse events post-transplant. Additional analyses of graft function and survival at 6 and 12 months are ongoing.

	COVID-19 (n = 7)	nonCOVID-19 (n = 11)
Age (y)	47.1 ± 10.0	55.4 ± 9.3
LAS at transplant	88.4 ± 1.1	88.2 ± 2.6
Total duration ECMO (d)	85.4 ± 53.5	14.5 ± 12.9
Total ischemia time, L lung (min)	317.5 ± 162.3	296.4 ± 69.9
Total ischemia time, R lung (min)	381.7 ± 162.5	367.4 ± 74.0
Total LOS (d)	100.6 ± 23.4	81.4 ± 36.1
Post-transplant LOS (d)	49.6 ± 13.1	54.1 ± 28.4
Post-transplant ICU LOS (d)	39.7 ± 71.7	13.0 ± 6.8

**Table 1.** Comparison of baseline characteristics and outcomes of COVID-19 vs nonCOVID-19 lung transplant recipients. Values shown are average ± standard deviation.

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### A Comparison of Short-Term Morbidity and Mortality Among Inpatient Lung Transplant Recipients Transplanted for COVID-19 and Other Restrictive Lung Diseases

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**Purpose:** Patients with respiratory failure (RF) who are hospitalized at the time of lung transplant (LTx) have higher post-LTx morbidity and mortality than those who are well enough to remain at home. Complications may be even worse in patients transplanted for COVID-19 (C19), as they are commonly critically ill having endured prolonged mechanical ventilation, ECMO support, myopathy, malnutrition, and superimposed infections. In a retrospective cohort study, we compared inpatient lung transplant recipients (LTxRs) transplanted for C19 vs. other underlying restrictive lung diseases (RLDs)

**Methods:** After IRB approval, patients who underwent inpatient LTx between 1/1/2014 and 8/31/2021 were categorized by indication: C19 or RLD. We excluded LTxRs <18 years old, a primary indication for LTx other than UNOS disease group D, and redo LTx. Primary outcomes were postoperative morbidity and 90-day survival.

**Results:** Out of 163 inpatient LTxRs, 141 met inclusion criteria: 11 (7.8%) with C19 and 130 (92.2%) with RLD. LTxRs with C19 were younger, had a longer pre-LTx hospital stay, and more likely needed pre-LTx mechanical ventilation and ECMO support. LTxRs with C19 were also more likely to have severe adhesions intraoperatively and their chest was more commonly left open after LTx due to a perceived risk of ongoing bleeding. In addition, LTxRs with C19 had a higher prevalence of PGD3 at 72 hours and longer post-LTx hospital stays and trended toward longer post-LTx mechanical ventilation and need for inpatient rehabilitation. The 2 groups had similar 90-day survival (C19, 100% vs. RLD, 95.4%,  $p=0.472$ ), however, LTxRs with C19 had a higher incidence of acute cellular rejection and DSA production (>2,000 MFI) within 6 months of transplant.

**Conclusion:** LTxRs with C19 are typically sicker and have more post-LTx complications than LTxRs with RLD hospitalized at the time of LTx. However, 90-day survival is comparable and high in both groups. Long-term follow-up is needed.

Variable	Inpatient LTx for C19 (n=11)	Inpatient LTx for RLD (n=130)	p-value <sup>Ω</sup>
<b>Baseline</b>			
Male sex	9 (81.8)	108 (71.1)	0.444
Age (years) <sup>†</sup>	47 (42.5, 56.7)	61.6 (54.8, 67.8)	0.009
Body mass index at listing (kg/m <sup>2</sup> ) <sup>†</sup>	28.9 (25.3, 30.2)	26.1 (22.8, 29.7)	0.358
Lung allocation score <sup>†</sup>	84.5 (48.5, 88.5)	76.5 (52.8, 88.9)	0.843
Duration from initial hospitalization to LTx (days) <sup>†</sup>	100 (85, 121)	15 (9, 22)	<0.001
<b>Pre-transplant</b>			
Mechanical ventilation before LTx	10 (90.0)	57 (37.5)	0.001
Life support (vasopressors) before LTx	7 (70.0)	63 (41.4)	0.077
ECMO	8 (72.7)	42 (27.8)	0.002
Dialysis between listing and LTx	1 (9.1)	4 (2.8)	0.230
mPAP (mmHg) <sup>†</sup>	25.5 (22, 36.5)	26 (20, 34)	0.877
PCWP (mmHg) <sup>†</sup>	11 (8, 16)	10 (6, 14)	0.453
Cardiac output (L/min) <sup>†</sup>	7.35 (6.3, 8.7)	5.5 (4.8, 6.7)	0.012
<b>Intraoperative</b>			
CFB/ECMO	7 (63.6)	65 (58.0)	0.719
Bleeding	2 (18.2)	35 (31.3)	0.387
Severe adhesions	8 (72.7)	33 (29.5)	0.004
Ischemia time, right lung (minutes) <sup>†</sup>	250.5 (214, 368)	275 (216, 318)	0.844
Ischemia time, left lung (minutes) <sup>†</sup>	221.5 (170, 297)	241 (203, 308)	0.737
<b>Perioperative</b>			
Duration of mechanical ventilation			0.082
<48 hours	0 (0.0)	63 (41.4)	
48 hours – 5 days	3 (27.3)	25 (16.4)	
>5 days	8 (72.7)	50 (39.5)	
Ventilator support, duration unknown	0 (0.0)	3 (2.0)	
Unknown	0 (0.0)	1 (0.7)	
Chest left open	8 (72.7)	11 (37.9)	0.049
Inhaled nitric oxide at 72 hours post-transplant	4 (40.0)	13 (10.3)	0.006
Dialysis prior to discharge	2 (18.2)	14 (9.3)	0.339
30-day readmission	2 (20.0)	34 (31.8)	0.432
Discharge disposition			0.076
Home	0 (0.0)	52 (34.2)	
Skilled nursing facility	0 (0.0)	3 (2.0)	
Acute rehabilitation	11 (100.0)	92 (80.5)	
Death	0 (0.0)	5 (3.3)	
Duration of hospital stay (days) <sup>†</sup>	47 (26, 61)	23 (14, 39)	0.002
Blood products transfused during first 2 weeks, total <sup>†</sup>	11 (8, 17)	8 (2, 25)	0.813
Packed red blood cells	5 (3, 8)	3 (1.5, 8)	0.134
Fresh frozen plasma	4 (2, 8)	3 (0, 5)	0.132
Platelets	2 (1, 2)	1 (0, 2)	0.342
<b>Follow-up outcomes</b>			
ACR grade A2 in 6 months	4 (40.0)	11 (10.3)	0.017
De novo DSA>2000 MFI in 6 months	7 (63.6)	16 (18.5)	0.001
ACR events in 6 months, total <sup>†</sup>	1 (0, 1)	0 (0, 1)	0.143
<b>≥1-year outcomes</b>			
De novo DSA >2000 MFI within 1 year	N/A	17 (11.2)	N/A
ACR events, total <sup>†</sup>	N/A	0 (0, 1)	N/A

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### Airway Complications After Lung Transplant for Post Coronavirus Disease (COVID-19) Acute Respiratory Distress Syndrome (ARDS) Related End Stage Lung Disease: Single Centre Experience

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**Purpose:** Severe COVID-19 ARDS related end stage lung fibrosis with irreversible changes is a newer indication for lung transplantation with acceptable survival rate. Airway complication post lung transplant is a major source of morbidity and mortality with incidence as high as 25 to 49 percent. Patients with end stage COVID-19 fibrosis are likely to be clinically deconditioned with long duration of extracorporeal oxygenator (ECMO) support, high burden of sepsis and prolonged respiratory support which may affect the airways post lung transplantation.

**Methods:** This is a retrospective observational study after obtaining institutional ethical clearance. We reviewed electronic medical data of patients who underwent lung transplantation for post COVID-19 ARDS related fibrosis. We evaluated the incidence and type of airway complications and the various therapeutic interventions applied for its management.

**Results:** Between May 2020 and September 2021 our centre performed 23 bilateral lung transplants for end stage COVID-19 ARDS related fibrosis. 22 patients were on ECMO support with mean duration of 50.9 days before transplantation. All patients underwent lung transplantation with central Venous-Arterial ECMO support with mean organ ischaemia time of 360±154 minutes. The incidence of airway complication in our study group was 56%. We observed anastomotic narrowing in 3(13%), distal airway narrowing in 4(17%) and sloughing/coating of anastomotic site in 5(22%) patients. Nonspecific inflammatory polypi around the bronchial anastomotic site were noticed in 4(17%) and mild airway anastomotic dehiscence in 2 subjects. 8(34%) patients required serial bronchoscopy and balloon