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Lung Transplant for Patients with COVID-19 Bridged with VV ECMO: Initial Experience

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Purpose: During the COVID-19 pandemic, veno-venous Extracorporeal Membrane Oxygenation (VV ECMO) has been used extensively for respiratory failure refractory to conventional mechanical ventilation (MV) and rescue maneuvers. However, the worldwide experience with COVID-19 patients undergoing lung transplant (LTx) with pre-LTx VV ECMO support is limited. Therefore, we sought to report our institution's early experience with COVID-19 patients who underwent LTx after VV ECMO.

Methods: We retrospectively identified 5 COVID-19 patients who underwent LTx after VV ECMO support. Patients were required to have a negative nasopharyngeal swab and a negative bronchoalveolar lavage for COVID-19 prior to LTx listing. We analyzed preoperative and operative characteristics, details of VV ECMO support and early post-transplant outcomes.

Results: The mean age of our cohort was 50 years (range 39-57 years) and all patients were male. Mean recipient BMI was 30 (range 22-37). Mean duration of VV ECMO pre-LTx was 60 days (range 44-72 days). At the time of the LTx operation, 60% (3/5) of patients were on VV ECMO, 20% (1/5) were on mechanical ventilation (MV), and 20% (1/5) were on supplemental oxygen only. Preoperatively, 80% (4/5) had acute kidney injury and 20% (2/5) were on dialysis. LTx was performed via clamshell approach with intraoperative venoarterial ECMO support in all cases. For 60% (3/5) patients, VV ECMO support was continued after LTx and discontinued on postoperative days 0, 1 and 6, respectively. All-cause mortality was 40% (2/5), related to sepsis and multi-organ failure, and both deaths occurred an average of 115 days post-LTx. Mean length of stay for surviving patients was 59 days (range 22-117). In the first 3 months postop-LTx, grade A2 acute cellular rejection was noted in 2 patients, A1 in 2 patients, and antibody-mediated rejection in 1 patient.

Conclusion: Our early experience with LTx for COVID-19 patients supported with VV ECMO support is notable for 1) prolonged VV-ECMO duration and significant morbidity pre-LTx, and 2) early mortalities related to sepsis and multiple organ failure. These data highlight a uniquely complex patient population that carries high risk of multi-organ failure and other comorbidities dictating careful selection for transplant.

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Shifting Paradigms in ECMO Support for Severe COVID-19 Respiratory Failure Result in over 80% Hospital Survival in 2021

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Purpose: The role of ECMO support for COVID-19 patients with severe respiratory failure has evolved over the course of the pandemic. Rapid exchange of experience among caregivers led to changes in ECMO support strategies, and patient management that resulted in improved outcomes in recent pandemic waves. We present our 18 months experience comparing patient outcomes in 2020 vs 2021.

Methods: We present a single institution retrospective analysis of patients receiving ECMO for COVID-19 ARDS. Patient data include demographics, comorbidities, time from admission to intubation and to initiation of ECMO support, type and duration of ECMO support, major patient and ECMO circuit complications, and hospital survival to discharge, or acceptance/transfer to lung transplant center.

Results: A total of 20 patients were identified for analysis. The cohort was predominantly male (65%) with an age and body mass index (BMI) average of 49.2±10.2 years and 32.8±5.9 kg/m², respectively. The average length of stay was 44.8±16.3 days and 55%. Most common support mode was veno-venous ECMO (90%) with a right femoral vein/right internal jugular cannulation (60%), and 75% required ECMO-circuit exchange. Comparing patients supported in 2020 vs 2021, time from intubation-to-ECMO, admission-to-tracheostomy, and ECMO-to-discharge were statistically significant (p=0.015; 0.014; 0.05; CI 95%). Overall survival rate was

65%, with a significant increase to 83% in 2021. Congruently, 55% of all discharged patients underwent ambulatory physical therapy treatment. ECMO-related complications were observed in 30% of the patients, including cardiovascular accident (CVA) (20%), clotting of the system (15%), and hemorrhaging from tracheostomy requiring revision (20%). When comparing groups, early tracheostomy was related to improved survival (p=0.014, CI 95%). 35% patients were accepted / transferred for lung transplantation.

Conclusion: Changes in management of patients receiving ECMO for COVID-19 ARDS, including anticoagulation with bivalirudin, early tracheostomy and physical therapy, conversion to VAV ECMO, and referral to lung transplant resulted in 60 day hospital survival of 83% in 2021.

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Lung Transplantation for COVID-19-Induced Respiratory Failure: Single-Center Case Series

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Purpose: Prior to the COVID-19 (C19) pandemic, adult respiratory distress syndrome (ARDS) was an unusual indication for lung transplant (LT); thus, short- and long-term outcomes data are lacking. As the pandemic continues, there is an increased need for post-LT data. Thus, we report our single-center experience transplanting 11 patients for C19 ARDS.

Methods: We conducted a chart review of LT recipients (LTRs) transplanted for C19 ARDS between 8/1/21 and 7/31/21. Descriptive statistics were used.

Results: Most LTRs were male (82%, n=9). The median age at LT, body mass index, and lung allocation score were 47 (43, 54) years, 28.9 (26, 30) kg/m², and 84.5 (60, 88), respectively. The median interval from initial hospitalization to listing and listing to LT was 119 (97, 124) and 5 (4, 11) days, respectively. Pretransplant COVID-related morbidities included venous thromboembolism (55%, n=6), hemorrhage requiring transfusion (36%, n=4), pneumothorax (55%, n=6), bacterial pneumonia (82%, n=9), bacteremia (45%, n=5), fungemia (36%, n=4), renal failure requiring renal replacement therapy (RRT; 9%, n=1), cerebrovascular event (9%, n=1), and musculoskeletal weakness (100%, n=11). Most patients required mechanical ventilation (91%, n=10), and 55% (n=6) were intubated at the time of LT. Furthermore, most patients required ECMO support (73%, n=8) and 36% (n=4) were on ECMO at the time of LT. Intraoperatively, 64% (n=7) of patients required cardiopulmonary bypass, 73% (n=8) had severe intrathoracic adhesions, 73% (n=8) had delayed chest closure, and 18% (n=2) had an unexpected return to the operating room. Prevalence of primary graft dysfunction grade 2 or 3 at 72 hours was high (91%, n=10), median duration of mechanical ventilation after LT was 10 (6, 19) days, but no one required ECMO rescue. To date, 10 (91%) LTRs have been discharged, and 2 (20%) have been readmitted within 30 days; the median post-LT hospital stay was 18 (14, 24) days; all discharged LTRs required acute rehabilitation for a median of 17.5 (14, 23) days. Ten LTRs (91%) at a median of 208 (167, 245) days post-LT; 1 LTR died 344 days post-LT of treatment-refractory allograft failure due to aspiration and antibody-mediated rejection.

Conclusion: Despite pre-LT critical illness, intraoperative challenges, and prolonged post-LT recovery, LT appears feasible for carefully selected patients with irreversible C19 ARDS.

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COVID-19 Has a High Mortality Rate in Lung Transplant Recipients: A Large Single-Center Experience

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Purpose: Immunosuppressed patients, particularly solid organ transplant recipients, are at an increased risk of death from COVID-19. We report a large single-center experience with COVID-19 in lung transplant recipients (LTRs).

Methods: This is a retrospective cohort study of 91 LTRs diagnosed with COVID-19 between March 1, 2020 and August 31, 2021. Patients were