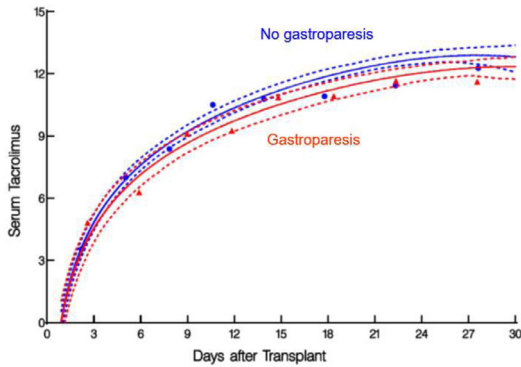




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



**Figure 1:** Mean predicted serum tacrolimus level over 30 days post lung transplant. Solid lines represent model-based estimates that account for within-patient variability from repeated measurements and solid lines are enclosed by a dashed 68% confidence band; symbols are crude estimates that do not account for repeated measurements but are used to show resemblances of model-based estimates.

(916)

### Is Pre-Lung Transplant Evaluation of Physical Performance and Frailty Correlated with Post-Transplantation Lung Function?

N. Free,<sup>1</sup> M. Schissel,<sup>2</sup> M. Urban,<sup>3</sup> D. Berkheim,<sup>3</sup> B. Small,<sup>4</sup> H. Strah,<sup>4</sup> and A. Siddique.<sup>3</sup> <sup>1</sup>College of Medicine, University of Nebraska Medical Center, Omaha, NE; <sup>2</sup>Department of Biostatistics, University of Nebraska Medical Center, Omaha, NE; <sup>3</sup>Department of Surgery, University of Nebraska Medical Center, Omaha, NE; and the <sup>4</sup>Department of Internal Medicine, University of Nebraska Medical Center, Omaha, NE.

**Purpose:** To evaluate if pre-lung transplant measures of physical performance and frailty correlate with post-transplant lung function.

**Methods:** The study was designed as a retrospective cohort analysis of lung transplant recipients at our institution from 2016 to 2020. Patients underwent pre-transplant evaluation which included 6-minute walk distance (6MWD) and timed up and go (TUG). TUG was measured as the amount of time required for a patient to stand from a chair, walk 3 meters, then return and sit down. Pulmonary function was performed at protocol specified times within the first year after transplant and if clinically warranted. Reference FEV1 was calculated as the mean of the patient's two best measurements within the first year, post-transplant. Pre-transplant data was evaluated for correlation with post-transplant FEV1 using Spearman Correlation. Analyses were done using SAS, Version 9.4.  $P < .05$  was considered statistically significant.

**Results:** Overall, 33 patients were included in the study. Median age was 57 years (IQR 47.1, 62.1), 18 (55%) were males, 15 (45%) were females. The median lung allocation score for the study group was 35.63 (IQR 33.1, 40.9). Underlying conditions included chronic obstructive pulmonary disorder (n=13), interstitial lung disease (n=11), cystic fibrosis (n=8), pulmonary hypertension (n=1). There were 30 bilateral and 3 single-lung transplants. Longer pre-transplant 6MWD was found to have a correlation with post-transplant FEV1 ( $R=0.47$ ,  $P=.0082$ ). Faster pre-transplant TUG was found to have a correlation with post-transplant FEV1 ( $R=0.44$ ,  $P=.030$ ).

**Conclusion:** Patients who walk limited distances in 6 minutes or take longer to get up and go prior to transplant may have poorer FEV1 performance post-transplant. 6MWD and TUG are simple measures that may be correlated with post-transplant lung function.

(917)

### Does Pre-Lung Transplant Grip Strength Correlate with Post-Transplant Lung Function in the First Year?

N. Free,<sup>1</sup> M. Schissel,<sup>2</sup> M. Urban,<sup>3</sup> D. Berkheim,<sup>3</sup> B. Small,<sup>4</sup> H. Strah,<sup>4</sup> and A. Siddique.<sup>3</sup> <sup>1</sup>College of Medicine, University of Nebraska Medical Center, Omaha, NE; <sup>2</sup>Department of Biostatistics, University of Nebraska Medical Center, Omaha, NE; <sup>3</sup>Department of Surgery, University of

Nebraska Medical Center, Omaha, NE; and the <sup>4</sup>Department of Internal Medicine, University of Nebraska Medical Center, Omaha, NE.

**Purpose:** To determine the correlation between pre-lung transplant grip strength and post-transplant lung function measured by FEV1.

**Methods:** The study was designed as a retrospective cohort analysis of lung transplant recipients at our institution from 2016 to 2020. Grip strength was collected for patients at the time of evaluation, prior to lung transplantation, using the patient's best measurement on hand dynamometer. Post-transplant reference FEV1 (measured as the mean of the patient's two best measurements within the first year post-transplant) was evaluated for its correlation with the grip strength using Spearman Correlation. Analyses were done using SAS, Version 9.4.  $P < .05$  was considered statistically significant.

**Results:** Overall, 33 patients were included in the study. Median age was 57 years (IQR 47.1, 62.1), 18 (55%) were males, 15 (45%) were females. The median lung allocation score for the study group was 35.63 (IQR 33.1, 40.9). Underlying conditions included chronic obstructive pulmonary disorder (n=13), interstitial lung disease (n=11), cystic fibrosis (n=8), pulmonary hypertension (n=1). There were 30 bilateral and 3 single-lung transplants. Grip strength was found to have a significant positive correlation with post-transplant reference FEV1 at 1 year ( $R=0.57$ ,  $P=.0017$ ).

**Conclusion:** Stronger grip strength prior to transplant correlated with greater FEV1 performance in the first year, post-transplant. Pre-transplant grip strength may predict lung function after transplant.

(918)

### Lung Transplantation in COVID-19 Induced End Stage Lung Disease

E. Scott,<sup>1</sup> W. Wright,<sup>1</sup> J. Mehaffey,<sup>1</sup> N. Teman,<sup>1</sup> H. Mannem,<sup>2</sup> and M. Roeser.<sup>1</sup> <sup>1</sup>Surgery, Cardiothoracic Surgery, University of Virginia, Charlottesville, VA; and the <sup>2</sup>Medicine, Pulmonary and Critical Care Medicine, University of Virginia, Charlottesville, VA.

**Introduction:** In a subset of patients COVID-19 induced lung injury progresses to irreversible lung damage and pulmonary fibrosis. Bilateral orthotopic lung transplant (BOLT) has been used as a rescue therapy in these patients. We describe four patients who were bridged to BOLT using venovenous extracorporeal membrane oxygenation (VV-ECMO).

**Case Report:** Between October 13, 2020 and February 14, 2021, four patients with SARS-CoV-2 infection underwent BOLT for end-stage pulmonary fibrosis demonstrated on computed tomography. Median age was 42 years and three were male. One patient had a prior history of undifferentiated interstitial lung disease managed with chronic steroids. Pre-transplant hospital course was complicated by right ventricular failure due to pulmonary hypertension in two patients and ventilator-associated pneumonia in one. One patient developed heparin-induced thrombocytopenia requiring anticoagulation with bivalirudin perioperatively. Three patients were non-ambulatory and bedridden for a median of 54 days prior to surgery. Timing of transplantation ranged from hospital day 26 - 68 with a median of 48 days. At the time of transplant, three patients were mechanically ventilated via tracheostomy, while all were on VV-ECMO a median of 27 (IQR 11 - 42) days. All patients underwent BOLT via clamshell exposure utilizing cardiopulmonary bypass (CPB) with aortic and right atrial cannulation. VV-ECMO was discontinued intraoperatively in all cases after initiating CPB. All patients required intraoperative blood transfusion with a median of 3 units. The three patients with tracheostomy prior to transplant were liberated from the ventilator a median of 9 days postoperatively and decannulated from their tracheostomy a median of 11 days postoperatively. Aside from one patient requiring short courses of hemodialysis, there were no significant postoperative complications. Patients were discharged a median of 17 (14 - 20) days following surgery. After a median follow-up of 226.5 (223 - 257.75) days, all four patients were alive with no supplemental oxygen requirement.

**Summary:** Pulmonary fibrosis secondary to COVID-19 pneumonia can be successfully treated with VV-ECMO and subsequent lung transplantation in select patients. Special consideration should be given to this patient population as they may not meet traditional listing requirements. We report a 100% oxygen-free survival rate at six months.

(919)

#### Single Lung Transplantation for Pulmonary Fibrosis Secondary to COVID-19

*Y.A. He,<sup>1</sup> R.K. Chihara,<sup>2</sup> E.E. Suarez,<sup>1</sup> H.J. Huang,<sup>3</sup> A. Goodarzi,<sup>3</sup> S.W. Yau,<sup>3</sup> J.G. Youssef,<sup>3</sup> A.O. Gaber,<sup>2</sup> T.E. MacGillivray,<sup>1</sup> and E.Y. Chan.<sup>2</sup>* <sup>1</sup>Department of Cardiovascular Surgery, Houston Methodist Hospital, Houston, TX; <sup>2</sup>Department of Surgery, Houston Methodist Hospital, Houston, TX; and the <sup>3</sup>Department of Medicine, Houston Methodist Hospital, Houston, TX.

**Introduction:** As of April 2021, 78 lung transplants (LTx) were performed for a diagnosis of COVID-19: 50 for COVID-19 ARDS and 28 for pulmonary fibrosis. Bilateral LTx has been recommended as many patients develop significant pulmonary hypertension. Additionally, native lung explants may include cavitary areas of pneumonia, which could serve as a nidus for infection. Single LTx (SLTx) can be considered in patients who have chronic pulmonary fibrosis secondary to COVID-19 with a short window to receive a transplant, or who would otherwise be considered for a single lung. There have been no published cases of a single lung transplant for COVID-19 pulmonary fibrosis. We present a case of a patient with pulmonary fibrosis from COVID-19 who underwent SLTx.

**Case Report:** A 70yo male with O+ blood type was hospitalized 8/2020 to 10/2020 with COVID-19 pneumonia, treated with Remdesivir and Tocilizumab. He had hypoxia but never required intubation. His course was complicated by bilateral pneumothoraces requiring chest tubes. He developed pulmonary fibrosis requiring 6 L of oxygen at rest. CT scan of his chest showed multifocal, peripheral prominent ground glass opacities and interlobal septal thickening with traction bronchiectasis. Ventilation-perfusion scan demonstrated 22% perfusion to the left lung and 78% to the right lung. Right heart catheterization showed pulmonary artery pressures of 36/12 mmHg. His pulmonary function test was suggestive of restrictive disease (FEV 0.81 L [30%], FVC 0.96 L [27%], and FEV1/FVC 85%) that had worsened over time. He was presented at multidisciplinary review board with recommendation to list for left SLTx, which was activated August 2021. The patient was admitted in September 2021 and underwent left single lung transplant via left anterolateral thoracotomy, off cardiopulmonary bypass. Total ischemia time was 3:54. Explant pathology showed end stage pulmonary fibrosis. The patient was extubated on postoperative day 1 with an uneventful postoperative course. He was discharged to skilled nursing facility on postoperative day 26 for rehabilitation.

**Summary:** SLTxp is safe and feasible for COVID-19 related pulmonary fibrosis in well-selected patients who have a short window to receive a transplant.

(920)

#### Lung Transplant from a DCD Donor with a Previous Symptomatic COVID Infection

*H.H. Ahmed, M. Husain, A. Jothidasan, C. Zeschky, B. Zych and U. Stock.* Cardiothoracic Transplantation Surgery Department, Harefield Hospital, London, United Kingdom.

**Introduction:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a worldwide pandemic affecting more than 172 million confirmed cases. The likelihood of historic donor infection is increasing. Here we report a lung transplantation of a previously SARS-CoV-2 positive organ donor.

**Case Report:** A 49-year-old female who underwent left single lung transplantation for interstitial lung disease. The lung was obtained from a donation after cardiac death (DCD) using abdominal reperfusion of a 23 years old female donor died of intracranial bleeding with history of covid infection 8 month prior to lung donation. According to the donor records, the symptoms were mild, and required no hospital admission. She had ongoing loss of taste and smell till time of donation. There were no respiratory symptoms. At time of retrieval, chest x ray was normal and blood gases were normal, however, bronchoscopy revealed severe inflammation of the right-side mucosa so the decision was to proceed with the left lung only as it had normal blood gases, good recruitment and no consolidation as well as non inflamed bronchial mucosa. patient had single off pump left lung transplant through left anterior thoracotomy approach. After the surgery, patient was extubated on day 1 in ICU, discharged from ICU on day 3 and discharged from the hospital after 27 days. There was no evidence for primary graft dysfunction or acute rejection. After 6 month of the surgery, FVC is 2.26 L (78.2% predicted) and FEV1 is 1.9L (70.2% predicted).

**Summary:** This case showed that it is possible to proceed with lung transplant from a donors who had previous mild covid infection. As DCD donation might limit preoperative invasive investigations such as bronchoscopies careful examination and proper radiological and functional assessment for the donor lung after donation including EVLP needs to be considered.

(921)

#### Successful Percutaneous Mechanical Suction Thrombectomy of Extracorporeal Filtration System Following Bilateral Lung Transplantation Secondary to COVID-Pneumonia

*R.J. Vela, C. Heid, L.C. Huffman, A. Hackmann and M. Peltz.* Cardiovascular & Thoracic Surgery, UT Southwestern Medical Center, Dallas, TX.

**Introduction:** COVID infections show increased risk of thromboembolic events. We report a case of a 43 year old male with acute Covid-19 pneumonia necessitating veno-venous ECMO and RVAD support as bridge to pulmonary transplantation. At transplant, he had thrombus along his extracorporeal pulmonary artery cannula necessitating percutaneous mechanical thrombectomy.

**Case Report:** The patient presented as a transfer to our institution with COVID-19 related ARDS in refractory respiratory failure with multiple bronchopleural fistulas. Shortly after admission, veno-venous ECMO was initiated and over time was fully ECMO dependent due to extensive tissue destruction with essentially no functional lung tissue. He was converted to right internal jugular-left subclavian vein ECMO-RVAD configuration while assessing for transplantation. After 135 days of support, a suitable donor was identified and was taken for bilateral lung transplantation with ECMO/RVAD support. This was complicated by a frozen chest, massive transfusion, and primary graft dysfunction necessitating postoperative maintenance of circulatory support. Intraoperatively, a large thrombus burden was found along the pulmonary artery outflow cannula. His chest was left open at that time while his graft recovered. Three days later, a percutaneous suction thrombectomy device was inserted through his right femoral vein and under TEE guidance, he underwent suction thrombectomy of the pulmonary artery cannula clot burden (Figure 1). He was decannulated and underwent chest closure thereafter. He was anticoagulated post-operatively and has not had any further thromboembolic events.

**Summary:** Acute COVID-19 infection leads to a known increased risk of thromboembolic phenomena. We present an interesting approach to removal of ECMO-cannula associated thrombus in severe SARS-CoV-2 infection necessitating bilateral lung transplantation.