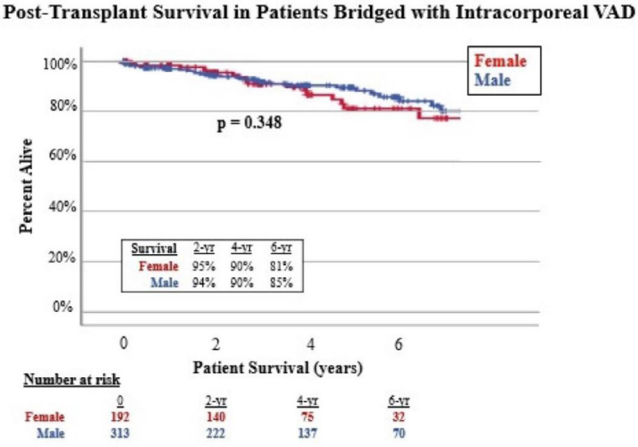
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.



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Remote Monitoring of Pediatric VAD Patients: Early Recognition for Improved Management

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Purpose: Over 50% of pediatric durable, discharge-eligible ventricular assist device (VAD) patients are discharged thereby transitioning high-risk patients to outpatient clinics. To enhance management of these patients, our center developed VAD specific content for a home monitoring iPad application (App). We hypothesized that remote monitoring via App + CardioMems Pulmonary Artery Pressure (CMEMS) could reduce risk among outpatient pediatric VAD patients.
Methods: VAD App parameters were developed by our VAD APRN and App company with existing technology for cardiac transplant patients. Manual data entry including VAD speed, output, power, driveline exit site (DLES) picture, residual heart failure symptoms, bleeding, and fluid status, is performed by the patient. The VAD team contacts patient and family if data has not been entered in 2+ days as these platforms are intended for daily trending to enhance remote monitoring. Continuous refinements have been made to the content based on utilization assessment by VAD team and patients.
Results: 13 patients have utilized the VAD App since 2019 for a total of 2519 VAD support days. Median age was 14 years (range 5-16), 7/13 had cardiomyopathy, 10 were supported on HeartMate3 and 3 with HeartWare. Of the 13 patients monitored, 7 were transplanted, 3 are alive and supported, and 2 have died (both destination therapy patients). AE's in this group represent 6 driveline related infections, 2 right heart failures, 4 arrhythmias. We have used CMEMS on 3/13 patients for 457 days of CMEMS monitoring. CMEMS remote monitoring helped recognize two separate episodes of ventricular tachycardia in a patient, allowing for early intervention. Frequent review of App data and CMEMS measurements allows for medical optimization, including diuretic and fluid management without additional clinic and inpatient encounters. Serial image monitoring of DLES directed care for early outpatient intervention of infection.
Conclusion: Remote monitoring in pediatric VAD patients provides more data collection, which augments care of these high-risk patients. Combined use of the App and CMEMS allows for improved optimization of heart failure medications and early recognition of high-risk events. Future study will investigate the impact on hospital admissions and acute heart failure exacerbations.

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End of Life in Children on Mechanical Circulatory Support

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Purpose: End of life (EOL) circumstances in children on mechanical circulatory support (MCS) remains an understudied area. Good EOL care facilitates bereavement experience and prevents complicated grief. Despite the ability of MCS to prolong survival, little is known regarding the actual EOL care on MCS, as well as the final trajectory until death.
Methods: Multicenter retrospective study from January 2015 to July 2020. Characteristics of death of children with heart disease requiring MCS were divided into 4 trajectories: A) early post-operative; B) persistent heart/other organ failure, C) improved, then terminal decline, and D) improved, then acute death. Patients on MCS for less than 24 hours were excluded.
Results: A total of 75 of 461 children died while receiving MCS. Mortality was 22/120 (18%) for VAD and 53/341 (15%) for ECMO. Overall, 54% patients were male and single ventricle congenital heart disease was the diagnosis in 14 (63%) VAD and 22 (41%) ECMO patients. The main cause of death was multi-organ failure (VAD: 86.4%, ECMO: 54%), followed by stroke (VAD: 18%, ECMO: 32%). Advanced care directives were established in 45% of patients on VAD and 51% of patients on ECMO with a mean time (SD) of 8.9 (+13.3) days for VAD and 0.78 (+1.15) for ECMO. Therapies utilized 48-hours preceding death (VAD and ECMO) included: mechanical ventilation (100% and 95.5%), fluids or nutrition (100% and 94%), dialysis (50% and 56%). The most common trajectory of death in VAD patients was C (41%), followed by D (27%); in ECMO patients, the majority sustained trajectory A (53%), followed by B (45%). Initial palliative care consultation (PC) was >8 days post MCS in 27% of VAD and 26% of ECMO patients. The average time (SD) from PC consultation to death was 67 (+31) and 8 (+11.9) days for VAD and ECMO, respectively. The average (SD) number of PC encounters was 16.4 (+12.2) and 4.1 (+5.8) on VAD and ECMO. All but one patient died in the ICU. There were no destination therapy patients. Nearly all children died immediately after or within 24 hours of withdrawal. Follow-up bereavement care was documented in 36% of VAD and 60% of ECMO patients, which in over 70% patients was provided by social workers.
Conclusion: Most children on MCS die in the hospital while still receiving aggressive support in the intensive care setting. Further work is needed to better understand the impact of early PC interventions and the barriers to PC interventions for children receiving MCS therapies.

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The United States Experience of Lung Transplantation in Recipients with COVID-19 Fibrosis: A UNOS/OPTN Analysis

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Purpose: Coronavirus Disease 19 (COVID-19) is a novel cause of end-stage fibrotic lung disease. Data has been limited to case series and single center reports with regards to outcomes in this unique cohort of patients. We sought to investigate the largest experience to date in patients with COVID-19 fibrosis (CVF) who underwent lung transplantation.
Methods: The United Network for Organ Sharing (UNOS) database was queried for all adult patients (≥18 years old) who underwent isolated lung transplantation between 2018 and July 2021. Recipients diagnosed with CVF were identified and compared to those with idiopathic pulmonary fibrosis (IPF). The IPF cohort included recipients from 2018, in the pre-COVID era. Baseline demographics, perioperative factors, and 30-day outcomes were examined.

Results: A total of 931 recipients were included in this study, 868 (93.2%) and 63 (6.8%) were IPF and CVF, respectively. IPF recipients were on average older (65 vs. 56 years, p<0.001), white race (83% vs. 51%, p<0.001), and less likely to be male (73% vs. 86%, p=0.04). BMI was similar between the IPF and CVF, 27.6 and 27.2 kg/m^2, as was the mean PAP 24 and 21 mmHg. The CVF cohort had lower predicted FVC (32% vs. 47%, p=0.01), and had less tobacco use (36% vs 61%, p<0.001). Mean creatinine level was clinically similar, though statistically higher in the IPF cohort, (0.83 vs 0.64, p<0.001). CVF recipients were on the waitlist for a shorter median duration (10 vs 32 days, p<0.001) with a higher LAS (85 vs 41, p<0.001). Notably, more CVF recipient were be on ECMO at time of listing (29% vs 2%, p<0.001) and require ventilatory support (27% vs. 2%, p<0.001). CVF recipients were more likely to receive a double lung transplantation compared to IPF (83% vs 64%, p=0.002), with similar ischemia times, 5.5 vs 5.1 hrs (p=0.17). Mortality at 30 days was comparable between CVF and IPF (7.0% vs. 2.3%, p=0.09), though 20 patients in the CVF cohort had missing data.

Conclusion: Patients with end-stage lung disease secondary to CVF are higher acuity, and more likely to require ECMO and ventilatory support as a bridge to lung transplantation. Early mortality, while comparable to non-COVID related fibrotic lung disease, remains almost 3 times higher with CVF. In the era of publicly reported survival outcomes, the transplant community may need to reconsider how we approach this new and devastating diagnosis of CVF.

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Radiographic and Histopathologic Lessons from COVID-19 Explants

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Purpose: COVID-19 acute respiratory distress syndrome (ARDS) can result in irreversible lung damage. Lung transplant is a viable option for such select patients. Our aim is to describe the radiologic features prior to lung transplant and post transplant explant pathology, in such patients.

Methods: A single center retrospective chart review was performed of adults who underwent lung transplant for COVID-19 ARDS from 7/1/2020 until 7/31/2021. Demographic data, imaging reports at the time of listing and explant pathology were collected.

Results: 25 patients were included and none of them had pre-existing lung disease. Chest CT reports obtained at the time of transplant listing and post transplant lung explant reports were reviewed. Most common radiographic and explant features were traction bronchiectasis and NSIP pattern interstitial fibrosis, respectively.

Conclusion: To our knowledge, this is the largest descriptive report on COVID 19 explants. Though NSIP pattern is the most common finding on explants, only 48% of patients had fibrosis on CT scan prior to listing. Hence, other findings reflective of end stage lung disease such as traction bronchiectasis, GGO's should be considered along with respiratory mechanics while assessing the need for lung transplant for COVID-19 ARDS.

Demographic Variables	
Age (years)	51 [IQR(44-54)]
Male	80% (n=20)
Female	20% (n=5)
Extracorporeal Life Support Bridge to Transplant	92% (n=23)
Mechanical Ventilation bridge to transplant	96% (n=24)
Nasal Cannula Oxygen Supplementation	4% (n=1)
Alive at the time of this study	100% (n=25)

CT Chest Radiographic Features at the time of transplant listing	
Traction Bronchiectasis	84% (n=21)
Consolidations	80% (n=20)
Pneumothorax	72% (n=18)
Fibrosis	48% (n=12)
Ground Glass Opacities (GGO's)	40% (n=10)
Pleural Effusions	40% (n=10)
Cystic Changes	28% (n=7)
Pneumomediastenum	16% (n=4)

Lung Explant Pathology	
NSIP (non specific interstitial pattern) interstitial fibrosis	76% (n=19)
UIP (usual interstitial pattern) interstitial fibrosis	4% (n=1)
Pulmonary Vascular Injury	72% (n=18)
Alveolar Hemorrhage	56% (n=14)
Organizing Pneumonia	44% (n=11)
Pleuritis	40% (n=10)
Cystic Cavitary Changes	32% (n=8)
Bronchopneumonia	32% (n=8)
Pulmonary Embolism	16% (n=4)
Abscess	4% (n=1)

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The Effect of COVID-19 Infection on Transplant Function and Development of CLAD in Lung Transplant Patients: A Multicenter Experience

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Purpose: Concerns have been raised on the impact of the coronavirus disease (COVID-19) on lung transplant (LTx) patients. The aim of this study was to evaluate the effect on the clinical course and transplant function pre- and post-COVID-19 infection in LTx patients.

Methods: Data were retrospectively collected from adult LTx patients with a proven COVID-19 infection from three Dutch transplant centres, between February 2020 and September 2021. Spirometry results were collected pre-COVID-19 infection and within 3 and 6 months post-COVID-19 infection.

Results: A total of 59 LTx patients had been tested positive for COVID-19. The median age was 58 years (IQR 49-66), 64% was male and median time since transplantation was 5 years (IQR 2-11). Thirty-three patients (56%) were hospitalized, 30 (51%) were in need for supplemental oxygen therapy, 17 (29%) were admitted to the intensive care unit (ICU) and 13 (22%) required invasive mechanical ventilation. Thirteen patients died (22%), 10 in ICU (77%), 3 (23%) on general wards. Post-COVID-19 spirometry results were available in 45 (76%) patients within three months post-infection and in 34 (58%) 6 months post-infection. Spirometry results and the prevalence of chronic lung allograft dysfunction (CLAD) are shown in Table 1. CLAD pre-COVID-19 was not associated with higher mortality (12% vs 10%, $p = 0.162$).

Conclusion: In LTx patients COVID-19 infection results in high hospitalization and mortality rate. FVC and FEV1 was declined three months after infection and gradually improved at 6 months post-COVID-19 infection. However, FVC remained significantly lower after 6 months, demonstrating