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**Methods:** 540 LTR from a U.S. center were sent an anonymous, on-line survey comprised of 5 reliable and valid subscales of the COVID Stress Scale (CSS): danger, socio-economics, contamination, checking and traumatic stress. Each subscale included 6 ordinal-scale items for a max subscale score of 24 that when summed yielded a total CSS score up to 120. Higher scores indicate higher stress. Other items included socio-demographics, COVID exposure, testing and impact on seeking medical care.

**Results:** The final sample included 226 LTR (42%) who completed all CSS items, including 58% male, 56% over 60 years, 95% white, 74% married/living with partner. Nearly half reported concerns about face-to-face visits with providers; 42% reported delaying or cancelling medical appointments due to COVID concerns; 26% opted for virtual visits. 96% were never exposed to a known or suspected COVID case. Of the 48% who were tested for COVID, only 2 were positive. The primary sources of information sought about COVID in descending order were transplant providers (29%), TV news (28%), and the internet (15%). Mean total CSS scores were 31.8 (17.8). Mean subscale scores in descending order of distress were danger (9.24), contamination (9.19), checking (6.05), socioeconomic (4.98), and traumatic stress (2.33). LTR with higher total scores were significantly more likely to delay medical appointments ( $p=0.04$ ) and cancel face-to-face medical visits ( $p=0.000$ ) due to COVID-related concerns. No significant differences were found due to age, marital status, education, years since transplant, or ever having a COVID test. There were too few minorities to examine differences due to race or ethnicity.

**Conclusion:** COVID-related stress was low. LTRs with higher stress reported worrisome delays or cancelled appointments. Transplant providers are a trusted source of support and information.

(327)

#### Death Rate in Lung Transplant Recipients during the COVID-19 Outbreak in France

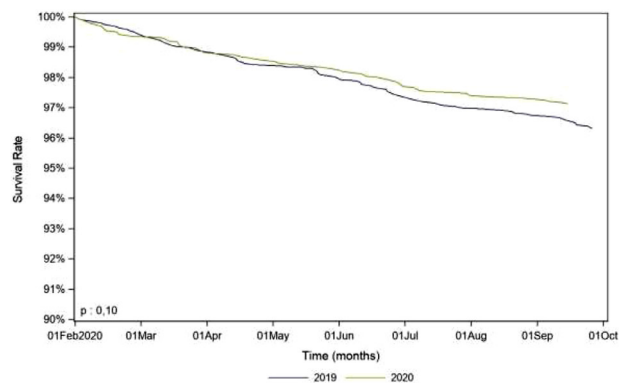
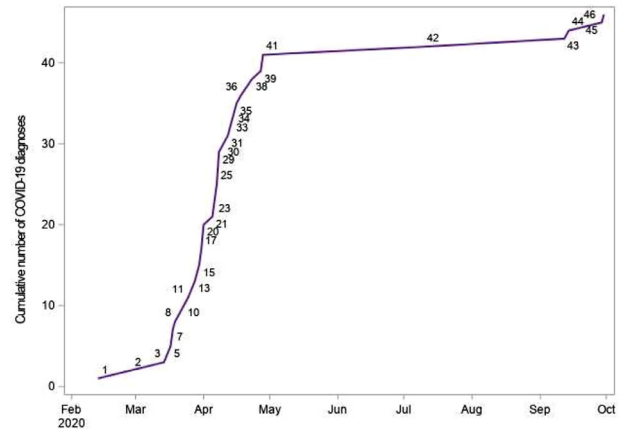
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**Purpose:** Data on outcomes in lung transplant recipients with SARS-CoV-2 infection remains limited. Given the potential higher COVID-19 severity in lung recipients, the Agence de la biomédecine has limited the transplant program to patients with high-urgency status during the first epidemic wave. The program has been fully restored where possible during the second epidemic wave. This study aimed to assess the impact of COVID-19 on lung recipient mortality in France.

**Methods:** All lung recipients with COVID-19 reported in the French national registry CRISTAL between February 1<sup>st</sup> and September 30<sup>th</sup> 2020 were included in the study. Patient characteristics were extracted from CRISTAL. Cumulative number of cases by month since February (Figure 1) and case fatality rate (CFR) were calculated. Mortality rates from February to September in the whole 2019 and 2020 recipient cohorts were compared. Survival curves were estimated using Kaplan-Meier method and compared using the log-rank test.

**Results:** Of the 46 patients (median age (IQR) 51 years (39-60), 54% female, median time from transplantation 3.5 years (0.8-7.1)) 88% required hospitalization including 21% in ICU. Eight patients died (CFR: 17.4%). No difference in 3-month survival was observed between 2020 and 2019 recipient cohorts (98.6% 95%CI [98.0%-99.0%] vs 98.4% [97.8%-98.8%], respectively) (Figure 2).

**Conclusion:** COVID-19 was associated with lower fatality rate in lung recipients than in other organ transplant recipients and did not result in an excess mortality. These findings suggest that continuing lung transplant activity during the COVID-19 pandemic was a reasonable option.



(328)

#### Lung Transplantation for Acute Respiratory Distress Syndrome Related to COVID-19: The Lesson Learned from the First Two Cases

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**Purpose:** The respiratory system, and namely the lung, is undoubtedly the preferential target of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The clinical pictures are extremely various, up to the intensive care unit (ICU) admission for acute respiratory distress syndrome (ARDS). Lung transplantation (LT) is a consolidate therapeutic option for end-stage chronic respiratory diseases. Its role in an acute setting is questionable, particularly due to lack of experiences, donor shortage, and the difficulty to fully evaluate the potential recipient. We report our preliminary experience with the first two cases of LT for SARS-CoV-2 related ARDS, trying to provide some food for thought.

**Methods:** We retrospectively analysed our first two cases of bilateral LT for ARDS after COVID-19. We recorded data on pre-transplantation clinical course, transplantation management and outcomes.

**Results:** The two patients had a similar clinical evolution of COVID-19. Transplantations were successful in both cases; the first patient is alive and in good condition 5 months after transplantation, while the second died 62 days after surgery. Table 1 shows clinical details and relevant time-points.

**Conclusion:** Our experience showed that LT for COVID-19 is feasible. Importantly, observing a dedicated protocol made the procedure safe for the healthcare staff involved. On the other hand, our second unsuccessful case poses relevant questions: first of all, lung transplantation should be reserved to highly selected patient, after careful clinical, infective as well

as psychiatric evaluation. The ethical aspects should also be considered in this situation, with regard to the centre rate mortality on waiting list. Anyway, the potential role of LT in the acute and sub-acute/chronic settings suggests the need for maintaining LT centre active during pandemic. Finally, COVID-19, once more, imposes to share clinical experiences.

**Table 1** Clinical details and relevant time-points of patients' course

|                              | Patient 1              | Patient 2              |
|------------------------------|------------------------|------------------------|
| Age                          | 18                     | 48                     |
| Sex                          | M                      | M                      |
| ABO group                    | A+                     | B+                     |
| Comorbidity                  | None                   | None                   |
| Preoperative support         | MV + VV-ECMO (55 days) | MV + VV-ECMO (53 days) |
| Pre-Tx colonization          | Ps. Aeruginosa         | KPC-Kp                 |
| <b>Tx date</b>               | May 18                 | June 8                 |
| Nasal swab SARS-CoV-2        | Negative               | Negative               |
| Type of Tx                   | Bilateral              | Bilateral              |
| Intraoperative support       | VA-ECMO                | VA-ECMO                |
| <b>Postoperative support</b> | VV-ECMO (1 day)        | VV-ECMO (2 days)       |
| Compliance FKT program       | Full                   | Absent                 |
| Septic shock                 | No                     | 3 episodes             |
| <b>Last follow-up (days)</b> | 150                    | 62                     |
| Status                       | Alive                  | Dead                   |
| Last FEV1                    | 68% (3L) (Best=72%)    | N/A                    |
| Last FVC                     | 61% (3.2L)             | N/A                    |
| Ab anti-HLA                  | Negative               | N/A                    |
| TBB                          | RA1-BX-RCO             | N/A                    |

(329)

#### Poor Outcomes of COVID-19 in Lung Transplant Recipients. Cohort Study in a Single Center

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**Purpose:** The world SARS-CoV-2 pandemic has affected global health, including the health of lung transplant recipients. There is very little data reported on the outcomes of SARS-CoV-2 on this group of patients

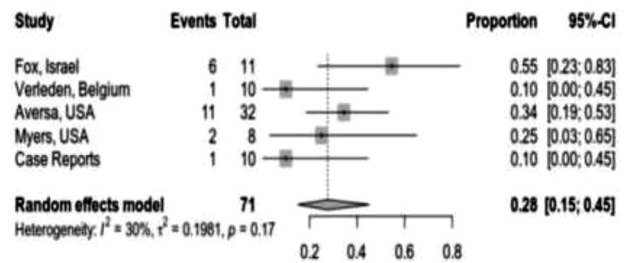
**Methods:** Retrospective cohort study approved of all LTx recipients with symptoms consistent with COVID-19 investigated with naso-pharyngeal swabs and reverse PCR for SARS-COV-2. Positive test for SARS-COV-2 inserted to our cohort and investigated their files. We also conducted pooled analysis of published cases of covid 19 cases of lung transplant recipients

**Results:** We identified eleven cases of COVID-19 among a cohort of 348 LTx recipients. All but two patients were hospitalized. Seven patients required intensive care and six died (55% mortality). Non-survivors had lower baseline FEV1 than survivors and worse and/or deteriorating chest radiographic scores during admission. No effect of medical therapy including steroids and remdesivir could be determined. This mortality rate compared poorly general hospitalized COVID-19 patients at our institution (13%) and national mortality rate of 0.3% in the general population. Incidence of COVID-19 was similar to the general population (0.3%). In a pooled analysis of published cases, we determined mortality of 28% across different reports of lung transplant patients with COVID-19.

**Conclusion:** COVID-19 disease is very severe in lung transplant recipients. In the absence of effective therapy and vaccination, transplant physicians should concentrate their efforts on prevention of disease and encourage meticulous preventative behavior by recipients under their care.

Outcomes for Lung transplant Recipients infected with COVID-19

| no Pt | Diagnosis time (days) | Hospitalization (days) | Final status | Respiratory therapy    | Covid therapy | Steroids | Complications |
|-------|-----------------------|------------------------|--------------|------------------------|---------------|----------|---------------|
| R1    | 3                     | 30                     | Survived     | Nasal Canula           | none          | PO       | CVA           |
| R2    | 0                     | 3                      | Survived     | Nasal Canula           | anti IL2      | PO       | none          |
| R3    | 0                     | 7                      | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R4    | 0                     | 9                      | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R5    | 0                     | 18                     | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R6    | 0                     | 20                     | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R7    | 4                     | 10                     | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R8    | 0                     | 7                      | died         | Mechanical Ventilation | Remdesvir     | IV       | AKI,ALI       |
| R9    | 0                     | 0                      | Home         | None                   | none          | none     | none          |
| R10   | 3                     | 0                      | Home         | None                   | none          | none     | none          |
| R11   | 1                     | 4                      | Addmitted    | ECMO                   | Remdesvir     | IV       | AKI,ALI       |



(330)

#### Lung Allograft Dysfunction in a COVID-19 Transplanted Patient is Associated with a Peculiar Immunopathological Phenotype

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**Purpose:** Lung transplantation (LT) after severe SARS-CoV-2 infection is emerging as a life-saving medical procedure for selected patients who experience acute respiratory distress syndrome (ARDS). We present the first immunopathological evaluation of a lung allograft rejection in a patient who underwent LT because of irreversible ARDS related to COVID-19.

**Methods:** Two male patients with irreversible ARDS caused by COVID-19 underwent bilateral LT at our Institution. A surveillance transbronchial biopsy (TBB) was performed 2 months after LT in the first patient (Pt#1), while the