

Changes in Liver Transplant Center Practice in Response to Coronavirus Disease 2019: Unmasking Dramatic Center-Level Variability

TO THE EDITOR:

We read the recently published article by Agopian et al.⁽¹⁾ with great interest. The authors have provided an important assessment of liver transplant volumes across the United Network for Organ Sharing regions from February to March in both 2019 and 2020. The study revealed a significant center-based difference in the volume of transplantations, particularly among centers located in the same metropolitan area as New York City. Our hospital is located in a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epicenter in the Bronx, which has more than 40,000 coronavirus disease 2019 (COVID-19) cases as of the publication of this document. Authors attributed this difference to multiple factors including hospital resource allocation and prioritization for COVID-19 relative to liver transplantation and concerns about the status and risk for COVID-19 infection of donors, recipients, and transplant team members. As the authors note, both patient and graft survival rates are key metrics that must be elucidated in order to resume pre-COVID-19 liver transplant volume.

As physicians at a hospital at the epicenter of the COVID-19 pandemic, we would like to take this

opportunity to share our first-hand experience with liver transplantation including the all-important outcomes of our patients with recent liver transplant who were infected with COVID-19.

We observed a peak of 1912 admissions to our health system for COVID-19 on April 13, 2020, from an initial 3 admissions on March 10, which then decreased to 923 on May 4, with an estimated 30-day mortality of 30%. There were 13 patients who underwent liver transplants at our center from February 1 through April 30. Given the exponential rise of COVID-19 cases during this time period, we reduced transplant activity to mobilize hospital resources for COVID-19 patients. Initially, we attempted to create COVID-19-free spaces in the intensive care unit and transplant ward, but this became impossible by March 23 due to the number of COVID-19 infected patients in the hospital, which exceeded 700 hospital beds. We then began mandating that all health care providers use full personal protective equipment for all admitted patients on the solid organ transplant ward regardless of COVID-19 status.

At the time of this publication, all patients are alive, but the COVID-19 infection rate in the recent transplant patients was 38% (5/13). Among the 5 patients with recent orthotopic liver transplantation (OLT) and COVID-19 infection, 1 converted to positive COVID-19 by nasal swab polymerase chain reaction (PCR) during their index hospitalization. It is unclear if the patient was infected by asymptomatic staff members or by visitors before a ban on outside visitors was implemented. The other 4 patients were discharged home without demonstrable COVID-19 infection and were subsequently readmitted due to symptomatic infection, thus indicating that discharge planning during this time was a challenge. Three COVID-19-infected patients exhibited mild clinical disease, 2 exhibited moderate disease, and none had severe disease.

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TABLE 1. Patient Characteristics

Age, years	Etiology of Liver Disease	COVID-19 Severity	COVID-19 to OLT Interval (days)	CXR Finding	Lowest O ₂ Saturation (%)	Admission Tacrolimus	C-reactive protein (mg/dL)	D-dimer (µg/mL)	Interleukin 6 (pg/mL)	Ferritin (ng/mL)	Platelet count (k/µL)
44	Hepatitis B virus	Mild	38	Diffuse	95	12	1.5	1.74	30	1166	211
59	Alcohol	Mild	28	Patchy	94	15.7	9.9	5.75	57	1571	201
60	Nonalcoholic steatohepatitis	Mild	11	Diffuse	95	8.5	3	6.4	10	780	615
47	Hepatocellular carcinoma	Moderate	67	Diffuse	88	18	11.8	0.84	135	563	660
33	Alcohol	Moderate	67	Diffuse	90	24	3.1	3.7	77	3008	102

Diffuse infiltration on chest X-ray (CXR), diarrhea, and supratherapeutic tacrolimus (over 10 ng/dL) were common presentations, seen in 4/5 patients with recent OLT and COVID-19 infection (Table 1). All COVID-19-infected patients received hydroxychloroquine for 5 days and prophylactic anticoagulation, which was converted to therapeutic anticoagulation when D-dimers exceeded 3 ng/dL. Two patients were randomized to a clinical trial (remdesivir and leronlimab), and 1 patient received remdesivir through a compassionate care program. Our standard immune suppression regimen is basiliximab induction (days 0 and 4), prednisone taper, mycophenolate mofetil (MMF), and tacrolimus with target trough levels of 8-10 ng/dL. For COVID-19-infected recipients, MMF was discontinued, and tacrolimus trough levels maintained on the low-normal end (6-7 ng/dL).

Patients were kept in the hospital for observation until they were able to ambulate and maintain oxygen saturations greater than 92% on room air. Patients were tested with nasal swab PCR weekly until a negative PCR was obtained. Repeat nasal swabs were done weekly, but at the time of publication, there were no patients who cleared SARS-CoV-2 by PCR nasal swab. This may be due to persistent viral shedding in immunosuppressed patients. SARS-CoV-2 antibody immunoglobulin G results for all 5 patients are still pending. We also observed COVID-19 infections in 9 additional liver transplant recipients who underwent transplantation more than 90 days ago (ranging from June 2012 to December 2019) and were previously stable at home. Three of these patients were admitted from home with severe disease requiring intubation

with prolonged ventilator support, and they remain alive: 1 was discharged to a skilled nursing facility, 1 is recovering off ventilatory support after tracheostomy, and 1 still remains tracheostomized at another institution.

Our experience suggests that liver transplant surgery during a period of high COVID-19 prevalence is associated with a high rate of early perioperative COVID-19 infection; however, all of the patients who acquired COVID-19 infection in the early postoperative period have clinically recovered despite persistence of viral detection by nasal swab PCR. Our initial small experience in this unique cohort should be pooled with larger data sets as the collective experience grows. These data may help inform transplant physicians who are weighing the risks/benefits of liver transplantation during active local COVID-19 pandemics.

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REFERENCE

- 1) Agopian V, Verna E, Goldberg D. Changes in liver transplant center practice in response to Coronavirus Disease 2019: unmasking dramatic center-level variability. *Liver Transpl* 2020. <https://doi.org/10.1002/lt.25789>.