JEMTAC
Journal of Emergency Medicine Trauma & Acute Care
A PEER REVIEWED JOURNAL

OPEN ACCESS

Qatar Health 2021 Conference

Coronavirus disease 2019 in solid organ transplant recipients in a setting of proactive screening and contact tracing

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ABSTRACT

Background: As of 26 June 2020, the global number of infections caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), had reached 11 million, with more than 500 thousand associated deaths[1]. Limited clinical information about COVID-19 on solid organ transplant (SOT) are available so far. We herein report our preliminary experience with COVID-19 in SOT recipients in the first few weeks of the outbreak in Qatar.

Method: All SOT recipients with laboratory-confirmed COVID-19 up to 23 May 2020 were included. Baseline characteristics, antivirals and immunosuppressive management, complications, and outcomes were retrospectively extracted from the electronic health system. Categorical data are summarized as frequency and percentages, while continuous variables are presented as medians and ranges.

Results: Twenty-four SOT patients with COVID-19 were included in this report (kidney: 16, liver: 6, heart: 1, and combined liver and kidney: 1). The median age was 57 years (range 24–72). Thanks to proactive screening, five (21%) asymptomatic cases were diagnosed (Table S1). Among the other 19 symptomatic patients, fever (15/19) and cough (13/19) were the most frequent presenting symptoms (Table S1). All patients were hospitalized; 5 (21%) required invasive mechanical ventilation in the intensive care unit (ICU) (Table S2). Eleven (46%) patients developed acute kidney injury as a complication, including 3 in association with drug-drug interactions involving investigational COVID-19 therapies (Table S2). Maintenance of immunosuppressive therapy was changed in 18 (75%) patients, but systemic corticosteroids were not withdrawn in any. After a median follow up of 43 days (26–89), 18 (75%) patients had been discharged home, 3 (12.3%) were still hospitalized, 2 (8.3%) were still in ICU, and 1 (4.2%) had died (Table S2).

Conclusion: Although higher mortality rates were observed in other reports,[2,3] our results suggest that asymptomatic COVID-19 is possible in SOT recipients and that overall outcomes are not consistently worse than other immunocompetent patients. The results require validation in larger cohorts.

Keywords: transplant, COVID19, SARS-CoV-2, coronavirus, immunosuppressive therapy

http://dx.doi.org/10.5339/jemtac.2021.qhc.3

QSCIENCE
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Cite this article as: Alattar RA, Shaar SH, Othman M, Jarir SHA, Hashim SM, Iqbal F, Rustom F, Almaslamani MA, Omrani AS. Coronavirus disease 2019 in solid organ transplant recipients in a setting of proactive screening and contact tracing, *Journal of Emergency Medicine, Trauma & Acute Care, Qatar Health Care Conference* 2021:3 http://dx.doi.org/10.5339/jemtac.2021.qhc.3

Table 1. Baseline characteristics of 24 solid organ transplant recipients with SARS-CoV-2 infection

Case	Age (years)	Gender	Type of SOT	Month and year of transplant	Presenting symptoms	Date of 1st positive COVID-19 PCR	Radiological findings
A	63	Male	Kidney, deceased donor	June 2014	F, ST, M, N, V	March 23, 2020	Bilateral patchy infiltrates
B	72	Female	Heart, deceased donor	July 2007	F, C, M, N, V	April 3, 2020	Pulmonary congestion and left-sided pleural effusion
C	62	Female	Liver, living-related donor	April 2017	None	March 30, 2020	Unremarkable
D	44	Female	Liver, deceased donor	February 2020	None	April 3, 2020	Unilateral infiltrates
E	61	Female	Kidney, living-related donor	May 2015	F, C, D	April 14, 2020	Bilateral patchy infiltrates
F	40	Male	Kidney, living-unrelated donor	July 2018	F, ST, C, M, N, V	April 20, 2020	Unremarkable
G	46	Male	Kidney, living-unrelated donor	July 2015	C, ST	April 25, 2020	Bilateral patchy infiltrates
H	40	Male	Kidney, living-related donor	September 2019	F, BA	April 30, 2020	Unilateral infiltrates
I	62	Female	Liver, deceased donor	November 2015	F,C , D	May 5, 2020	Bilateral patchy infiltrates
J	69	Male	Kidney, living-related donor	June 2005	None	May 8, 2020	Unremarkable
K	54	Male	Kidney, deceased donor	October 2015	D, M	May 3, 2020	Unremarkable
L	58	Male	Kidney, living-unrelated donor	January 2014	F, C, D	May 4, 2020	Bilateral patchy infiltrates
N	61	Female	Kidney, living-unrelated donor	December 2010	F, C, D	May 15, 2020	Bilateral patchy infiltrates
M	47	Male	Kidney, deceased donor	January 2016	F	May 15, 2020	Unremarkable
O	52	Male	Kidney, living-unrelated donor	July 2016	F, C	May 15, 2020	Bilateral patchy infiltrates
P	55	Male	Kidney, live unrelated donor	March 2013	None	May 17, 2020	Unremarkable
Q	72	Male	Liver, unrelated donor Kidney, unrelated donor	November 2008	BA	May 17, 2020	Bilateral patchy infiltrates
R	24	Male	Liver, deceased donor	August 2016	None	May 17, 2020	Unremarkable
S	58	Male	Kidney, live unrelated donor	Feb 2008	F, C	May 18, 2020	Bilateral patchy infiltrates
T	59	Male	Liver, deceased donor	June 2014	F, C	May 19, 2020	Bilateral patchy infiltrates
U	54	Female	Kidney, living-unrelated donor	Oct 2015	F, ST, C, M	May 20, 2020	Bilateral patchy infiltrates
V	53	Female	Kidney, living-unrelated donor	April 2005	F, D, C, M	May 21, 2020	Bilateral patchy infiltrates
W	39	Male	Liver, deceased donor	Jan 2016	F, C, N	May 21, 2020	Bilateral patchy infiltrates
X	60	Female	Kidney, living-unrelated donor	2009*	Diz, LOT	May 23, 2020	Bilateral patchy infiltrates

*Month of transplant is not available. BA: body aches; C: cough; COVID-19: Coronavirus Disease 2019; CRP: C-reactive protein; Diz: Dizziness; D: dyspnea; F: fever; LOT: loss of taste; M: malaise; N: nausea; V: vomiting; ST: sore throat; LOT: loss of taste.

Table 2. Management, complications, and outcomes of 24 solid organ transplant recipients with COVID-19

Case	IST change	Investigational COVID-19 Therapies	Complications	Maximum Respiratory Support	ICU admission	Date of first of two consecutive negative SARS-CoV-2 RT-PCR	Outcomes at 28 days follow-up
A	FK withheld MMF withheld PRD increased	HCQ, AZT, OST, DRV/c, RBV, TCZ	ARDS AKI (stage 2, resolved) Liver injury (resolved) Gastric bleeding Hypokalemia Hypernatremia Hypocalcemia Hypomagnesemia	Mechanical ventilation	Yes	Negative	Hospitalized (Medical word)
B	FK continued PRD continued	HCQ, AZT, OST	AKI (stage 1, unresolved) Anemia Congestive heart failure UTI	Non-invasive ventilation	Yes	Negative	Hospitalized (Medical word)
C	FK continued MMF dose reduced	HCQ, AZT	None	Room air	No	Negative	Hospital discharge
D	FK continued PRD continued	HCQ, AZT	Hyperkalemia AKI (stage 1, resolved)	Room air	No	Negative	Hospital discharge
E	FK withheld MMF withheld PRD dose increased	HCQ, AZT, OST, LPV/r, TCZ	AKI (stage 2, resolved) Rhabdomyolysis ARDS Liver injury (resolved) Anemia Hyponatremia Hypertriglyceridemia Thrombocytopenia Leukocytosis	Mechanical ventilation	Yes	Positive	Hospitalized (Medical word)
F	FK continued MMF withheld PRD dose increased	HCQ, AZT, OST	Liver injury (resolved)	Room air	No	Negative	Hospital discharge

Table 2 – *continued*

Case	IST change	Investigational COVID-19 Therapies	Complications	Maximum Respiratory Support	ICU admission	Date of first of two consecutive negative SARS-CoV-2 RT-PCR	Outcomes at 28 days follow-up
G	FK dose reduced MMF continued PRD continued	HCQ, AZT, OST	Liver injury (unresolved)	Room air	No	Positive	Hospital discharge
H	FK withheld MMF withheld PRD dose increased	HCQ, AZT, OST	AKI (stage 1, resolved)	Room air	No	Positive	Hospital discharge
I	FK continued MMF continued	HCQ, AZT, OST	None	Room air	No	Negative	Hospital discharge
J	FK continued MMF dose reduced PRD continued	HCQ, AZT	None	Room air	No	Negative	Hospital discharge
K	FK withheld MMF withheld PRD dose increased	HCQ, AZT, LPV/r, TCZ	ARDS QTC prolongation Seizures Cardiorespiratory arrest AKI (stage 3, unresolved) Liver injury (resolved) D-Dimer elevated	Mechanical ventilation (Tracheostomy)	Yes	Positive	Hospitalized (ICU)
L	FK continued MMF withheld PRD dose increased	HCQ, AZT, OST, LPV/r, TCZ	ARDS Hypertensive urgency Cardiorespiratory arrest AKI (stage 2, resolved) Liver injury (unresolved) hypernatremia Hypercalcemia Hyperphosphatemia	Mechanical ventilation (Tracheostomy)	Yes	Positive	Hospitalized (ICU)
N	FK dose decreased MMF withheld PRD dose increased	HCQ, AZT, OST, TCZ	Supraventricular tachycardia AKI (Stage 1, resolved) Liver injury (unresolved)	Non-invasive ventilation	Yes	Negative	Hospital discharge

Table 2 – *continued*

Case	IST change	Investigational COVID-19 Therapies	Complications	Maximum Respiratory Support	ICU admission	Date of first of two consecutive negative SARS-CoV-2 RT-PCR	Outcomes at 28 days follow-up
M	FK continued MMF withheld PRD dose increased	HCQ, AZT, OST	Liver injury (resolved)	Room air	No	Negative	Hospital discharge
O	FK continued MMF withheld PRD dose increased	HCQ, AZT, OST, TCZ	AKI (Stage 1, resolved) Hypoglycemia	Non-invasive ventilation	No	Positive	Hospital discharge
P	CsA continued MMF withheld PRD dose increased	HCQ, AZT	Portal vein thrombosis Elevated D-Dimer Hyperuricemia Hyperchloremia	Room air	No	Negative	Hospital discharge
Q	FK continued MMF continued	HCQ, AZT	QTc prolongation	Non-invasive ventilation	No	Positive	Hospital discharge
R	FK continued MMF dose reduced PRD continued	AZT	None	Room air	No	Negative	Not admitted
S	CsA continued MMF withheld PRD dose increased	HCQ, AZT	Lymphocytopenia Thrombocytosis Hyperuricemia Elevated creatine kinase Elevated myoglobin	Room air	No	Negative	Hospital discharge
T	FK continued	HCQ, AZT, OST	Hypoalbuminemia AKI (Stage 1, unresolved)	Room air	No	Positive	Hospital discharge
U	FK continued MMF continued PRD continued	HCQ, AZT	None	Non-invasive ventilation	No	Positive	Hospital discharge
V	FK reduce MMF withheld PRD dose increased	HCQ, AZT, TCZ	ARDS Liver injury (unresolved) Pancreatitis Rhabdomyolysis Elevated bilirubin AKI (unresolved) Hyperkalemia	Mechanical ventilation	Yes	Positive	Died

Table 2 – *continued*

Case	IST change	Investigational COVID-19 Therapies	Complications	Maximum Respiratory Support	ICU admission	Date of first of two consecutive negative SARS-CoV-2 RT-PCR	Outcomes at 28 days follow-up
W	FK dose decreased MMF withheld	HCQ, AZT	Leukopenia Thrombocytopenia	Non-invasive ventilation	No	Negative	Hospital discharge
X	CsA continued MMF decreased PRD dose same	HCQ, AZT, TCZ	None	Room air	No	Negative	Hospital discharge

AKI: acute kidney injury; AZT: azithromycin; COVID-19: Coronavirus Disease 2019; CsA: ciclosporin; DRV/c: darunavir/cobicistat; FK: tacrolimus; HCQ: hydroxychloroquine; IST: immunosuppressive therapy; LPV/r: lopinavir/ritonavir; MMF: mycophenolate mofetil; MV: mechanical ventilation; OST: oseltamivir; PRD: prednisolone; RBV: ribavirin; TCZ: tocilizumab; UTI: urinary tract infection.

Ethical approval statement: The study was approved by the Hamad Medical Corporation Institutional Review Board MRC-01-20-191 with a waiver of informed consent.

Disclosures and acknowledgements: The authors of this manuscript have no conflict of interest in relation to this manuscript.

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