COVID-19 Infection in CAPD Patients: A Single-Center Indian Experience

Sir,

With more than 8 million cases of COVID-19 (coronavirus disease 2019) infection in India, chronic kidney disease (CKD) patients form a vulnerable high-risk group. Among the CKD patients, COVID 19 prevalence is the highest in transplant recipients followed by maintenance hemodialysis patients and those who are on continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD).[1] CAPD patients are trained to do the dialysis at home, therefore reducing the risk of COVID-19.[2] No data exist on home peritoneal dialysis (PD) and detection of SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) in the PD effluent in India. We present a single-center case series on the clinical characteristics and outcomes of chronic PD patients who developed COVID-19 infection in India.

This is a prospective, observational, case series of all CAPD who tested positive for COVID-19 infection between March 1, 2020, and October 31, 2020. The Ethical Committee clearance was obtained for chart review-based data collection. Nasopharyngeal swabs were sent to the laboratory for testing the *E* gene and *Orf1a* gene in a single reaction (Truenat Quattro, Molbio Diagnostics). The dialysis effluent collected in the 2-L drainage bag was sent to the laboratory for identification of COVID-19 by RT-PCR. The testing procedure was done from the dialysis effluent in 2-L bag after thorough mixing.

Five among the 56 prevalent CAPD patients developed COVID-19 (8.9%), and none of them died. None of the five patients had any augmented immunosuppressive state. The details of all patients are given in Table 1. Figure 1 illustrates the HRCT (high-resolution computed tomography) chest and chest X-ray findings from two of these patients. PD effluent from all the patients was negative for SARS-CoV-2 by RT-PCR. The most recent patient who was a diabetic with heart failure and contracted COVID-19 was switched over temporarily to slow low-efficiency dialysis in another center and was kept on noninvasive ventilation, and she has recovered now. She needed one re-hospitalization.

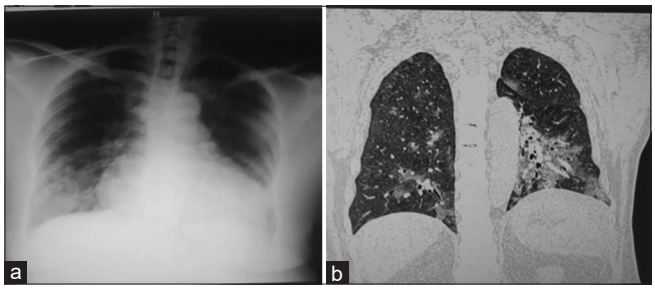

Figure 1: (a) Chest X-ray AP (anterior–posterior) view of Patient 2 showing right lower zone consolidation and changes of fluid overload. (b) HRCT (high-resolution computed tomography) chest of Patient 4 showing bilateral ground-glass opacities correlating with CORADS 6

Like all patients with CKD, those on CAPD carry an increased risk of infection due to their immunosuppressed state and comorbid conditions.[3] Our cohort contained patients with a significant comorbidity profile, but none had malignancy or were on immunosuppressive medications. We have trained a number of patients for home PD during the study period. Despite the risk factors, they seemed to do fairly well. The hand washing techniques that are perfected by these patients and social distancing probably mitigated their risk at the peak of the pandemic. Although our patients had a history of fever, at presentation three of them only presented with signs suggestive of fluid overload, which suggests that a high degree of suspicion is needed to identify COVID-19 infection in CAPD.

Sachdeva *et al*.[4] reported that three out of 11 patients who developed culture-negative peritonitis and postulated that the direct effect of the virus, hematogenous spread, touch contamination, the effect of inflammatory mediators, and superimposed bacterial translocation were due to diarrhea as causative mechanisms. We did not have any PD-related peritonitis in our cohort. One of our patients did develop acute pancreatitis, which was managed conservatively while continuing PD.

Vischini *et al*.[5] previously reported peritoneal dialysate being positive for SARS-CoV-2 in a COVID-19 patient. However, to the contrary, Candellier and Goffin,[6] in a letter to the editor, reported three patients on PD in whom the virus was not detected in the PD fluid despite the high viral load on the initial nasopharyngeal specimen. This seems to be more in concordance with our findings as we did not detect the virus in any of the PD-effluent samples despite repeated testing.

We describe a small cohort of home PD patients who developed COVID-19 infection with no mortality. There was an absence of detection of the SARS-CoV-2 virus in the dialysis effluent.

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Conflicts of interest

There are no conflicts of interest.

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Table 1: Characteristics of CAPD patients who developed COVID-19

Patient	1	2	3	4	5
Age (years)	74	55	61	60	41
Gender	Male	Female	Female	Male	Female
Diabetes mellitus	Yes	YES	No	Yes	No
Hypertension	No	Yes	Yes	Yes	Yes
Coronary artery disease	Yes	Yes	No	No	No
Hypothyroidism	No	No	No	Yes	Yes
EF (%)	39	35	64	57	
Smoking	No	No	No	No	No
CAPD/APD	CAPD	CAPD	CAPD	CAPD	CAPD
Exchanges	4 (1.5% × 4 L 2.5% × 4 L)	4 (2.5% × 6 L, 7.5% × 2 L)	3 (1.5% × 2 L, 2.5% × 4 L)	3 (7.5% × 4 L, 2.5% × 2 L)	3 (2.5% × 4 L, 1.5% × 2 L)
PD vintage (in months)	48	48	4	72	24
Blood group	O	A	A	B	B
COVID diagnosis by RT-PCR	Positive	Positive	Positive	Positive	Positive
Cycle threshold value	*E* Gene 25.5	*E* gene 22	*E* gene 20.13	*N* 23	*N* 20
	N2 27.8	*Orf1a* 22.25	*Rdrp* 21.0	*Orf1a* 25	*Orf1a* 25
Symptoms					
Fever	Yes	No	No	Yes	No
Cough	Yes	Yes	No	No	No
Breathlessness	Yes	Yes	No	Yes	No
Anosmia	No	No	No	Yes	No
Ageusia	No	No	Yes	No	No
Diarrhea	No	No	No	No	No
Abdominal pain	No	No	Yes	No	No
Anorexia	Yes		Yes	No	No
Contact history	No	No	No	No	Yes (spouse)
PD-effluent SARS-CoV-2 RT-PCR	Negative	Negative	Negative	Negative	Negative
Chest X-ray/CT chest findings	Right midzone and lower zone consolidation	Right Lower zone consolidation	Normal	CORADS 6	Normal
Hb (g/dL)	8.2	7.9	10.9	10.7	11
TC (cells/mm^3)	13,500	15,000	9,800	5,200	4,800
Lymphocyte (%)	5	14	6.8	16.4	10
CRP (mg/L)	82	46	29.3	85.4	8
LDH (IU/L)	468	561	227	200	198
D Dimer (ng/mL)	1,300	1,234	2,368	2,377	290
Ferritin (ng/ml)	3,000	2,914	601	413	326
Hospitalized	Yes	Yes	Yes	Yes	No
Oxygen requirement	Yes	Yes	No	No	No
Ventilation	Noninvasive ventilation	Noninvasive ventilation	No	No	No
Steroids	Yes	Yes	Oral dexamethasone 4 mg twice a day for 3 days	Intravenous methylprednisolone 40 mg once a day for 5 days	No
	IV methylprednisolone 40 mg once a day for 5 days	IV methylprednisolone 40 mg once a day for 5 days			
Remdesivir	Yes	Yes	No	Yes	No
	200 mg loading dose followed by 100 mg once a day for 5 days	200 mg loading dose followed by 100 mg once a day for 5 days		100 mg OD for 5 days	
Tocilizumab	Yes	No	No	No	No
	200 mg subcutaneous one dose				
Length of hospital stay (days)	10	10	14	6	-

Contd...

Table 1: Contd...

Patient	1	2	3	4	5
Readmission	No	Yes	No	No	-
Complications	None	Lung complications leading to readmission Needed temporary SLED	Acute pancreatitis (conservatively managed)	No	No
Outcome	Discharged Alive	Hospitalized Alive and off ventilator	Discharged Alive	Discharged Alive	Alive

CAPD=continuous ambulatory peritoneal dialysis, EF-ejection fraction, APD=automated peritoneal dialysis, PD=peritoneal dialysis, RT-PCR=reverse transcription polymerase chain reaction, SARS-CoV-2=severe acute respiratory syndrome coronavirus 2, CT=computed tomography, Hb=hemoglobin, TC=total count, CRP=C reactive protein, LDH=lactate dehydrogenase, SLED=sustained low-efficiency dialysis, IV=intravenous, OD=once a day

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