

Table S1 Basic characteristics in patients with mild and severe COVID-19

Clinical features	All patients (N=80)	Mild (N=21)	Severe (N=59)	P (M vs. S)
Characteristics				
Age, median (IQR), yr	57 (48-66)	50 (35–61)	61 (51–70)	0.002
Sex, male/female	49:31	10:11	39:20	0.135
Chronic medical illness				
Any	42 (52.50)	7 (33.33)	35 (59.32)	0.041
Cardiovascular disease	7 (8.75)	1 (4.76)	6 (10.17)	0.762
Cerebrovascular disease	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Chronic kidney disease	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Chronic liver disease	6 (7.50)	2 (9.52)	4 (6.78)	1.000
Chronic obstructive pulmonary disease	4 (5.00)	1 (4.76)	3 (5.08)	1.000
Diabetes	12 (15.00)	1 (4.76)	11 (18.64)	0.240
Hypertension	34 (42.50)	3 (14.29)	31 (52.54)	0.002
Tuberculosis	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Symptoms and signs				
Abdominal pain	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Chest stuffiness	7 (8.75)	1 (4.76)	6 (10.17)	0.762
Chills	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Diarrhea	4 (5.00)	0 (0.00)	4 (6.78)	0.521
Dizziness	2 (2.50)	0 (0.00)	2 (3.39)	1.000
Dry cough	39 (48.75)	8 (38.10)	31 (52.54)	0.255
Dry throat	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Expectoration	8 (10.00)	1 (4.76)	7 (11.86)	0.611
Fatigue	9 (11.25)	1 (4.76)	8 (13.56)	0.488
Fever	70 (87.50)	17 (80.95)	53 (89.83)	0.501
Headache	3 (3.75)	0 (0.00)	3 (5.08)	0.563
Myalgia	10 (12.50)	6 (28.57)	4 (6.78)	0.027
Nausea and vomiting	3 (3.75)	0 (0.00)	3 (5.08)	0.563
Pharyngalgia	1 (1.25)	0 (0.00)	1 (1.69)	1.000
Shortness of breath	12 (15.00)	0 (0.00)	12 (20.34)	0.059

Data are presented with median (IQR), Ratio, n (%), in which N is the total number of patients with available data. IQR, interquartile range. P values comparing mild and severe group are obtained by χ^2 test, Fisher' exact test, or Mann-Whitney U test. yr, year (s).

Table S2 Biochemical findings in patients with mild and severe COVID-19

Biochemical Indicators	Norma Range	Mild (N=21)	Severe (N=59)	Convalescence (N=55)	P (M vs. S)	P (S vs. C)
Blood Lactic Acid, mmol/L	0.50-1.60	1.50 (1.20-1.70)	1.95 (1.60-2.53)	1.80 (1.20-2.40)	0.003	0.070
D-dimer, µg/L FEU	0.00-700.00	262.50 (175.75-596.00)	813.00 (363.00-1549.75)	568.50 (346.00-1222.25)	<0.001	0.213
Urea, mmol/L	3.60-9.50	4.29 (3.35-4.76)	6.12 (4.61-8.40)	5.57 (4.75-7.88)	<0.001	0.635
Uric acid, µmol/L	208.00-428.00	237.50 (195.50-334.50)	220.00 (170.00-282.50)	215.00 (166.00-278.25)	0.412	0.384
Creatinine, µmol/L	57.00-111.00	66.00 (55.00-89.00)	72.00 (64.00-88.00)	70.00 (56.25-77.75)	0.248	0.043
eGFR (EPI-Cr)		94.41 (77.83-102.23)	92.01 (72.32-105.67)	98.16 (91.63-105.39)	0.724	0.055
Globulin, g/L	20.00-40.00	26.25 (23.35-28.45)	28.70 (25.80-33.60)	24.90 (21.45-29.80)	0.010	<0.001
Albumin, g/L	40.00-55.00	44.10 (40.40-46.60)	34.55 (31.80-39.10)	38.10 (33.60-40.85)	<0.001	0.011
ALT, U/L	9.00-50.00	20.00 (13.00-26.00)	21.50 (14.00-37.25)	40.50 (26.25-61.00)	0.342	<0.001
AST, U/L	15.00-40.00	20.00 (18.00-22.00)	24.00 (17.00-36.00)	21.00 (15.00-25.50)	0.043	0.003
Total Bilirubin, µmol/L	0.00-26.00	10.45 (5.58-12.28)	10.75 (7.90-17.70)	9.80 (6.60-12.40)	0.157	0.062
Hemoglobin, g/L	131.00-172.00	135.00 (122.50-147.75)	133.00 (121.00-146.75)	121.00 (104.00-132.50)	0.376	<0.001
Hematocrit, %	38.00-50.80	40.70 (36.33-43.10)	38.60 (34.55-43.10)	36.55 (31.33-40.85)	0.296	0.009
Blood platelet, x10E9/L	83.00-303.00	187.00 (141.50-271.00)	189.50 (156.00-232.75)	171.50 (118.25-224.75)	0.668	0.152
Natrium, mmol/L	137.00-147.00	140.00 (138.00-141.00)	138.00 (136.00-140.00)	140.00 (139.00-142.00)	0.015	0.001
Potassium, mmol/L	3.50-5.30	3.69 (3.53-4.15)	3.90 (3.59-4.07)	3.98 (3.69-4.20)	0.459	0.197
Total Calcium, mmol/L	2.11-2.52	2.17 (2.10-2.28)	2.06 (1.99-2.17)	2.16 (2.06-2.27)	0.001	<0.001

Data are presented with median (IQR). N is the total number of patients with available data. IQR, interquartile range. P values are obtained by t test, or Mann-Whitney U test. ALT, alanine aminotransferase. AST, aspartate aminotransferase.

Table S3 Biochemical findings in dynamic patients with COVID-19

Biochemical Indicators	Norma Range	Hospitalization (N=8)	Deterioration (N=8)	Convalescence (N=8)	P (H vs. D)	P (D vs. C)
Urea, mmol/L	3.60-9.50	4.03 (3.03-5.53)	7.35 (4.41-8.35)	4.78 (4.00-6.23)	0.029	0.094
Uric acid, µmol/L	208.00-428.00	265.50 (235.25-348.00)	224.00 (215.75-235.50)	254.00 (211.25-328.00)	0.104	0.091
Creatinine, µmol/L	57.00-111.00	82.50 (76.00-92.50)	71.50 (62.50-76.75)	67.50 (58.50-69.75)	0.007	0.178
eGFR (EPI-Cr)		95.22 (87.03-102.95)	105.60 (98.71-121.74)	114.19 (99.42-120.92)	0.033	0.574
Globulin, g/L	20.00-40.00	27.30 (26.73-31.28)	38.35 (26.33-41.80)	25.50 (21.45-33.25)	0.093	0.013
Albumin, g/L	40.00-55.00	42.05 (38.60-44.98)	35.30 (31.00-36.95)	39.75 (37.75-41.75)	0.001	0.006
ALT, U/L	9.00-50.00	18.50 (12.00-27.75)	15.50 (11.00-18.25)	48.50 (21.50-71.75)	0.325	0.161
AST, U/L	15.00-40.00	20.50 (16.50-27.75)	16.50 (13.75-19.00)	19.00 (13.25-34.00)	0.310	0.398
Total Bilirubin, umol/L	0.00-26.00	10.90 (9.70-14.28)	12.75 (9.33-22.90)	10.70 (8.75-13.28)	0.272	0.098
Hemoglobin, g/L	131.00-172.00	150.50 (137.50-153.75)	133.00 (120.00-136.00)	128.50 (118.50-135.50)	0.003	0.575
Hematocrit, %	38.00-50.80	43.30 (41.15-44.93)	38.80 (36.38-40.78)	38.15 (36.25-40.03)	0.004	0.662
Blood platelet, x10E9/L	83.00-303.00	151.50 (131.75-184.00)	243.50 (201.75-271.50)	223.50 (173.75-284.75)	<0.001	0.570
Natrium, mmol/L	137.00-147.00	139.50 (138.00-140.75)	136.00 (136.00-138.75)	140.00 (135.50-141.75)	0.120	0.065
Potassium, mmol/L	3.50-5.30	3.74 (3.49-3.90)	4.26 (3.75-4.75)	3.94 (3.77-4.34)	0.070	0.396
Total Calcium, mmol/L	2.11-2.52	2.15 (2.06-2.26)	2.09 (1.92-2.16)	2.20 (2.10-2.28)	0.063	0.026

Data are presented with median (IQR). N is the total number of patients with available data. IQR, interquartile range. P values are obtained by t test, or Wilcoxon test. ALT, alanine aminotransferase. AST, aspartate aminotransferase.

Table S4 The detailed information about CRRT therapy

Patients	Age	Sex	Life support	Comorbidities	Model	Duration (h)	Vascular Access Site	Blood Flow (ml/min)	Anticoagulation	Replacement fluid (ml/h)	Dialysate (ml/h)	Ultrafiltration rate (ml/h)
Patient 1	75	Male	Mechanical Ventilation+ECMO	Hypertension, diabetes, tuberculosis	CVVH	24	Right femoral vein	250	Heparin-free/citrate	3000	0	200
Patient 2	91	Male	Mechanical Ventilation	Hypertension, cardiovascular disease	CVVH	24	Right femoral vein	230	Low molecular weight heparin	2000	0	150-200
Patient 3	62	Male	High-frequency Ventilation	Hypertension, diabetes	CVVH	8-12	Right femoral vein	220	Low molecular weight heparin	3000	0	150-200
Patient 4	82	Female	Mechanical Ventilation+ECMO	Hypertension, cardiovascular disease	CVVH	24	Right femoral vein	230	Citrate	3000	0	150-200
Patient 5	91	Male	Mechanical Ventilation+ECMO	Hypertension	CVVHD	24	Right femoral vein	160	Citrate	1000	1000	150
Patient 6	73	Male	Mechanical Ventilation+ECMO	Hypertension	CVVHDF	12-24	Left femoral vein	150	Heparin-free/citrate	2000	0	150

CVVH, continuous veno-venous hemofiltration. CVVH, continuous veno-venous hemodialysis. CVVHDF, continuous veno-venous hemodiafiltration.

Table S5 Immune findings in patients with COVID-19 who received CRRT therapy

Immune Findings	Norma Range	CRRT_0w (N=6)	CRRT_1w (N=6)	CRRT_2w (N=6)	CRRT_3w (N=6)	P (0 vs. 1w)	P (0 vs. 2w)	P (0 vs. 3w)
Infection-related Biomarkers								
hs-CRP, mg/L	0.00-8.00	100.88 (51.59-155.74)	83.42 (42.81-183.37)	78.51 (26.99-135.28)	70.82 (39.16-166.54)	0.940	0.151	0.529
Procalcitonin, ng/mL	0.00-0.05	0.70 (0.35-4.45)	0.47 (0.22-1.02)	0.39 (0.20-1.75)	1.18 (0.48-1.48)	0.249	0.500	0.917
Inflammatory Cytokines								
IFN- γ , pg/mL	0.00-20.06	11.72 (2.41-29.36)	10.36 (7.10-20.96)	6.77 (3.52-15.76)	9.48 (6.84-33.18)	0.549	0.394	0.811
IL-10, pg/ml	0.00-2.31	8.21 (7.12-11.05)	8.69 (7.12-14.07)	5.49 (1.79-7.60)	6.59 (4.08-12.27)	0.753	0.052	0.463
IL-2, pg/ml	0.00-4.13	0.83 (0.71-1.08)	1.15 (0.71-1.95)	1.05 (0.71-1.67)	1.41 (0.65-1.68)	0.685	0.598	0.194
IL-4, pg/ml	0.00-8.37	1.22 (1.03-1.46)	1.45 (1.03-3.79)	1.44 (1.03-8.74)	0.68 (0.33-1.05)	0.225	0.343	0.026
IL-6, pg/ml	0.00-6.61	384.41 (229.40-812.99)	233.54 (68.59-979.16)	225.03 (56.15-751.05)	218.79 (131.25-516.12)	0.463	0.081	0.146
TNF- α , pg/ml	0.00-33.27	9.44 (6.71-48.58)	56.38 (1.34-96.63)	41.30 (11.09-107.78)	13.95 (1.45-36.21)	0.063	0.173	0.829
Immunoglobulins								
Ig A, mg/dL	100.00-420.00	152.50 (115.75-206.25)	202.50 (158.25-286.50)	234.00 (172.25-378.75)	255.50 (199.25-281.75)	0.083	0.047	0.000
Ig G, mg/dL	860.00-1740.00	1883.50 (1400.50-2536.50)	1837.00 (1439.75-2305.75)	2481.00 (1746.00-3246.50)	2247.00 (1289.00-2909.25)	0.989	0.134	0.531
Ig M, mg/dL	30.00-220.00	35.50 (29.75-60.75)	61.00 (42.50-76.00)	64.50 (52.75-85.50)	63.50 (25.25-74.75)	0.025	0.023	0.223
Complement Proteins								
C3, mg/dL	70.00-140.00	90.00 (58.50-101.75)	107.50 (86.50-119.50)	110.00 (90.25-132.75)	96.00 (77.50-108.00)	0.154	0.056	0.540
C4, mg/dL	10.00-40.00	18.00 (13.75-25.50)	17.00 (12.75-24.25)	16.50 (14.00-25.25)	13.50 (11.25-24.50)	0.438	0.476	0.262

Data are presented with median (IQR). N is the total number of patients with available data. IQR, interquartile range.

P values are obtained by t test, or Wilcoxon test.

hs-CRP, high sensitivity C-reactive protein. IFN, interferon. IL, interleukin. TNF, tumor necrosis factor. Ig, immunoglobulin. C3, complement 3. C4, complement 4.

Data are presented with median (IQR). N is the total number of patients with available data. IQR, interquartile range. P values are obtained by t test, or Wilcoxon test. hs-CRP, high sensitivity C-reactive protein. IFN, interferon. IL, interleukin. TNF, tumor necrosis factor. Ig, immunoglobulin. C3, complement 3. C4, complement 4.

Table S6 Biochemical findings in patients with COVID-19 who received CRRT therapy

Biochemical Indicators	Norma Range	CRRT_0w (N=6)	CRRT_1w (N=6)	CRRT_2w (N=6)	CRRT_3w (N=6)	P (0 vs. 1w)	P (0 vs. 2w)	P (0 vs. 3w)
Blood Lactic Acid, mmol/L	0.50-1.60	3.30 (2.85-4.25)	2.15 (1.83-2.63)	1.60 (1.48-2.33)	1.50 (1.00-1.95)	0.006	0.004	0.001
D-dimer, ug/L FEU	0.00-700.00	7656.50 (2077.00-18670.50)	10680.00 (3124.00-15579.25)	8329.00 (2847.50-16773.75)	5481.50 (3830.75-17970.00)	0.345	0.978	0.778
Urea, mmol/L	3.60-9.50	18.73 (10.33-31.30)	6.47 (4.33-19.33)	9.37 (6.44-16.85)	8.96 (5.50-13.17)	0.006	0.015	0.048
Uric acid, umol/L	208.00-428.00	252.00 (137.25-453.50)	100.00 (58.00-161.50)	80.50 (63.50-135.25)	125.00 (62.75-167.25)	0.018	0.020	0.050
Creatinine, umol/L	57.00-111.00	163.50 (53.00-544.25)	59.50 (47.25-208.75)	77.00 (51.75-187.75)	112.00 (42.50-241.25)	0.028	0.075	0.229
eGFR (EPI-Cr)		31.38 (9.40-102.13)	83.12 (27.86-105.47)	73.80 (32.25-100.88)	52.98 (17.16-101.49)	0.050	0.113	0.678
Globulin, g/L	20.00-40.00	33.60 (28.45-39.28)	31.95 (27.45-39.93)	37.55 (34.33-45.70)	35.70 (31.78-41.55)	0.857	0.039	0.591
Albumin, g/L	40.00-55.00	35.30 (31.50-37.35)	36.80 (33.45-39.18)	36.30 (34.88-40.80)	36.90 (33.43-40.68)	0.456	0.241	0.249
ALT, U/L	9.00-50.00	17.00 (13.50-27.75)	19.00 (14.25-41.75)	17.50 (14.00-31.50)	24.00 (14.75-50.75)	0.525	0.884	0.387
AST, U/L	15.00-40.00	32.00 (25.75-34.25)	32.50 (15.75-97.00)	36.50 (26.00-70.25)	36.50 (29.25-105.25)	0.600	0.132	0.178
Total Bilirubin, umol/L	0.00-26.00	17.70 (5.28-42.38)	36.15 (14.88-61.23)	23.05 (10.58-61.23)	33.25 (12.18-80.88)	0.017	0.338	0.096
Hemoglobin, g/L	131.00-172.00	92.00 (85.50-101.50)	91.50 (83.75-101.00)	88.00 (80.50-91.75)	78.50 (70.75-85.25)	0.704	0.116	0.029
Hematocrit, %	38.00-50.80	27.35 (24.70-31.00)	27.70 (24.58-31.88)	25.70 (23.73-29.18)	22.95 (21.23-26.40)	0.960	0.454	0.051
Blood platelet, x10E9/L	83.00-303.00	90.00 (58.50-120.25)	76.50 (64.25-110.00)	77.50 (65.75-106.50)	80.00 (33.25-133.75)	0.682	0.542	0.680
Sodium, mmol/L	137.00-147.00	140.00 (137.75-149.50)	139.50 (135.00-140.25)	137.50 (133.75-139.25)	138.50 (136.75-139.25)	0.221	0.081	0.224
Potassium, mmol/L	3.50-5.30	4.28 (3.99-4.76)	4.40 (3.93-4.62)	4.28 (4.05-4.43)	4.16 (4.09-4.28)	0.907	0.562	0.493
Total Calcium, mmol/L	2.11-2.52	2.00 (1.84-2.20)	2.15 (2.04-2.32)	2.30 (2.17-2.39)	2.30 (2.20-2.36)	0.069	0.006	0.007

Data are presented with median (IQR). N is the total number of patients with available data. IQR, interquartile range. P values are obtained by t test, or Wilcoxon test. ALT, alanine aminotransferase. AST, aspartate aminotransferase.