



Supplementary Table S1. Biological parameters before ECMO.

Biological parameters before ECMO	All patients (=50)	First Wave (=24)	Second Wave (=26)	P-value
pH	7.4 (7.3-7.4)	7.4 (7.3-7.4)	7.4 (7.3-7.4)	0.327
PaO ₂ /FiO ₂ , mmHg	70 (62-79)	73 (65-84)	68 (57-75)	0.04
PaCO ₂ , mmHg	54 (46-63)	52 (42-62)	56 (49-66)	0.067
Bicarbonates, mmol/L	29 (25-36)	29 (23-31)	31 (29-39)	0.009
Lactate, mmol/L	1.5 (1.1-1.9)	1.3 (1.1-1.7)	1.6 (1.1-1.9)	0.252
Urea, g/L	0.60 (0.40-0.93)	0.70 (0.30-0.98)	0.60 (0.40-0.93)	0.494
Creatinine, mg/L	8 (6-21)	10 (7-32)	6 (6-17)	0.082
Bilirubin, mg/L	6 (4-10)	6 (5-16)	6 (4-8)	0.363
WBC, 10 ⁹ /L	11 (9-15)	11 (9-14)	11 (10-16)	0.315
Lymphocyte count*, 10 ⁹ /L	0.7 (0.5-1.1)	0.7 (0.5-1.2)	0.7 (0.4-1.0)	0.209
Hemoglobin, g/dL	9.7 (8.4-10.0)	9.7 (9.1-11.0)	9.0 (8.1- 10.0)	0.217
Hematocrit, %	30 (26-33)	30 (28-33)	29 (25-33)	0.128
Platelets, 10 ⁹ /L	258 (199-351)	280 (243-359)	236 (187-314)	0.085
aPTT, ratio	1.5 (1.3-1.8)	1.5 (1.2-2.0)	1.6 (1.2-1.8)	0.995
PT, %	75 (68-84)	74 (65-81)	78 (70-85)	0.163
D-Dimères‡, µg/mL	3.9 (2.3-6.5)	4.0 (2.3-14.0)	3.5 (2.3-4.0)	0.178
Fibrinogen, g/L	7.6 (6.6-8.7)	8.0 (7.2-9.3)	7.1 (5.9-8.1)	0.009
CRP, mg/L	250 (107-330)	280 (138-336)	149 (89-313)	0.081
PCT, ng/mL	1.1 (0.4-3.3)	1.8 (0.6-7.1)	0.5 (0.2-1.6)	0.016
Ferritin#, ng/mL	1328 (789-2436)	1716 (875-3048)	1281 (638-1893)	0.349

Values are number (%) or median (interquartile range). aPTT : activated partial thromboplastin time.

†1 missing value in first wave group. *1 missing value in first wave group. ‡1 missing value in first wave group and 1 missing value in second wave group. #3 missing values in first wave group and 1 missing value in second wave group.

Supplementary Table S2. ECMO, ventilation, biological parameters and SOFA score at Venovenous Extracorporeal Membrane Oxygenation (V-V ECMO) Day 3 in First and Second Wave Groups.

Day 3 Characteristics	Parameters	All patients (=49)	First Wave Group (=23)	Second Wave Group (=26)	P-value
ECMO parameters	FmO ₂ (%) ^a	83 (70-100)	88 (70-100)	80 (68-100)	0.615
	RPM ^b	3800 (3325-4041)	3800 (3225-4350)	3750 (3350-4000)	0.513
	ECMO blood flow (L/min) ^c	5.4 (4.7-6)	5.9 (5-6.2)	5.1 (4.6-5.6)	0.012
	Sweep gas flow (L/min) ^d	6 (5-7)	6 (5-7.3)	6 (4.9-7)	0.562
	ASV	14	10	4	
	APRV	21	5	16	
	PSV	11	7	4	
	SB	2	0	2	
	FiO ₂ (%) ^e	50 (40-70)	50 (40-70)	50 (40-80)	0.151
	Vt (mL) ^f	230 (180-340)	280 (210-355)	205 (153-310)	0.058
	Vt IBW (mL/kg) ^g	3.4 (2.7-5)	4.1 (3.2-5.3)	3.0 (2.4-4.6)	0.074

Biological parameters	RR (cpm) [†]	20 (18-23)	20 (15-23)	20 (19-24)	0.405
	Pplat (cmH ₂ O) [#]	24 (21-26)	25 (22-28)	24 (20-26)	0.083
	PEP (cmH ₂ O) [‡]	12 (10-15)	14 (10-17)	12 (10-12)	0.096
	Driving Pressure (cmH ₂ O) [¶]	12 (9-14)	12 (8-14)	12 (10-14)	0.709
	Compliance RS (mL/cm H ₂ O) [¥]	20 (13-32)	23 (20-40)	14 (11-29)	0.026
	Mechanical Power (J/min) [⌘]	11.0 (7.1-14.0)	13.0 (9.7-19.0)	8.4 (5.4-12.0)	0.001
	pH	7.4 (7.4-7.5)	7.4 (7.4-7.5)	7.4 (7.4-7.5)	0.85
	PaO ₂ (mmHg)	76 (66-88)	77 (70-89)	72 (64-79)	0.133
	PaCO ₂ (mmHg)	43 (40-48)	41 (38-44)	47 (42-52)	0.014
	Bicarbonates (mmol/L)	28 (24-33)	26 (24-29)	31 (27-34)	0.033
	Lactate (mmol/L)	1.3 (0.9-2.0)	1.2 (0.9-2.0)	1.3 (0.8-1.8)	0.944
	WBC (10 ⁹ /L)	14 (11-18)	15 (11-18)	12 (11-17)	0.394
	Lymphocyte count (10 ⁹ /L) ^²	0.8 (0.4-1.3)	0.8 (0.4-1.3)	0.8 (0.4-1.3)	0.686
	Hemoglobin (g/dL)	8.3 (7.7-9.0)	7.9 (6.9-8.8)	8.8 (7.9-9.2)	0.011
	Platelets (10 ⁹ /L) ^³	173 (106-250)	216 (113-301)	162 (101-201)	0.133
	D-Dimères (µg/mL) ^⁴	4.0 (3.6-12.0)	3.9 (3.3-10.0)	7.8 (4.0-22.0)	0.145
	Fibrinogen (g/L)	6.2 (4.3-7.4)	6.6 (5.5-8.4)	5.3 (4.2-6.5)	0.117
	aPTT (ratio)	1.7 (1.3-2.5)	1.7 (1.3-2.6)	1.5 (1.3-2.2)	0.367
	Creatinine (mg/L)	9 (6-25)	14 (7-37)	6.5 (5-17)	0.009
	Bilirubin (mg/L)	7 (5-17)	17 (6-24)	6 (5-7)	0.002
	ASAT (UI/L)	62 (47-132)	73 (52-167)	55 (40-114)	0.058
	ALAT (UI/L)	51 (34-85)	44 (34-79)	54 (33-102)	0.703
	CRP (mg/L)	86 (58-170)	145 (58-191)	83 (52-104)	0.094
	PCT (ng/mL)	0.9 (0.3-2.3)	1.7 (0.7-2.9)	0.4 (0.2-1.2)	0.021
	SOFA Day 3	11 (9-14)	13 (11-15)	10 (8-13)	0.057

Values are number (%) or median (interquartile range). FmO₂=fraction of membrane oxygen. RPM=rate per minute. FiO₂=fraction of inspired oxygen. ACV=assist-control ventilation. APRV=airway pressure release ventilation. PSV=pressure support ventilation. SB=spontaneous breathing. Vt=Tidal volume. Vt IBW=ideal body weight tidal volume. RR=respiratory rate. Ppeak=Peak pressure. Pplat=plateau pressure. PEEP=positive end-expiratory pressure. Compliance RS = respiratory system compliance. aPTT=activated partial thromboplastin time. ASAT=aspartate aminotransferase. ALAT= alanin aminotransferase.

[†]1 missing value in first wave group, [‡]1 missing value in first wave group, [¶]1 missing value in first wave group, [¥]1 missing value in first wave group, [⌘]2 missing values in first wave group, ^²1 missing value in first wave group, ^³1 missing value in first wave group, ^⁴2 missing values in second wave group, ^⁵2 missing values in second wave group, ^⁶1 missing value in first wave group, ^⁷2 missing values in second wave group, ^⁸1 missing value in first wave group, ^⁹2 missing values in second wave group, ^{¹⁰}2 missing values in first wave group, ^{¹¹}1 missing value in second wave group, ^{¹²}1 missing value in first wave group, ^{¹³}1 missing value in second wave group, ^{¹⁴}1 missing value in first wave group, ^{¹⁵}2 missing values in second wave group, ^{¹⁶}1 missing value in first wave group, ^{¹⁷}2 missing values in second wave group, ^{¹⁸}1 missing value in first wave group, ^{¹⁹}2 missing values in second wave group, ^{²⁰}1 missing value in first wave group, ^{²¹}1 missing value in first wave group, ^{²²}1 missing value in first wave group, ^{²³}3 missing values in second wave group.

11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Supplementary Table S3. ECMO, ventilation, biological parameters and SOFA score at Venovenous Extracorporeal Membrane Oxygenation (V-V ECMO) Day 7 in First and Second Wave Groups.

Day 7 Characteristics	Parameters	All patients (=41)	First Wave Group (=17)	Second Wave Group (=24)	P-value
ECMO parameters	FmO ₂ (%)	80 (65-100)	80 (70-100)	75 (60-100)	0.693
	RPM	3600 (3100-4038)	4000 (2850-4400)	3500 (3200-3950)	0.233
	ECMO blood flow (L/min)	5.3 (4.5-6)	5.9 (4.5-6.9)	5.1 (4.4-5.5)	0.048
	Sweep gas flow (L/min)	7 (4.5-8)	6 (5-8.5)	7 (4-8)	0.974
	ACV	10	6	4	
	APRV	19	6	13	
	PSV	11	5	6	
	SB	1	0	1	
	FiO ₂ (%)	50 (40-65)	50 (45-65)	55 (40-68)	0.626
	Vt (mL) ^x	225 (153-375)	270 (210-395)	180 (130-360)	0.045
	Vt IBW (mL/kg) ^e	3.4 (2.3-5.1)	4.0 (3.3-5.6)	2.7 (1.9-5.1)	0.02
	RR (cpm) [†]	22 (17-28)	22 (17-28)	24 (15-26)	0.844
	Pplat (cmH ₂ O) [#]	25 (24-29)	28 (25-30)	24 (23-26)	0.031
	PEEP (cmH ₂ O) [‡]	12 (10-14)	12 (10-17)	10 (10-12)	0.134
	Driving Pressure (cmH ₂ O) [¶]	14 (11-15)	14 (11-16)	14 (11-15)	0.551
	Compliance RS (mL/cm H ₂ O) [¥]	18 (10-28)	20 (15-28)	16 (9-28)	0.165
	Mechanical Power (J/min) [⌘]	11 (7-25)	19 (9-30)	7 (6-22)	0.02
Biological parameters	pH	7.4 (7.4-7.5)	7.4 (7.4-7.4)	7.4 (7.4-7.5)	0.552
	PaO ₂ (mmHg)	70 (61-85)	78 (73-94)	65 (58-75)	0.005
	PaCO ₂ (mmHg)	44 (40-50)	41 (39-47)	45 (41-52)	0.112
	Bicarbonates (mmol/L)	29 (24-31)	25 (23-31)	30 (27-32)	0.064
	Lactate (mmol/L)	1.2 (0.1-1.6)	1.2 (0.8-1.6)	1.2 (1.1-1.6)	0.338
	WBC (10 ⁹ /L)	15 (11-21)	18 (14-21)	12 (9-18)	0.014
	Lymphocyte count (10 ⁹ /L)	0.9 (0.5-1.6)	1.5 (1.0-2.0)	0.8 (0.4-1.1)	0.001
	Hemoglobin (g/dL)	8.3 (7.6-8.8)	7.9 (7.3-8.3)	8.5 (7.7-9.0)	0.075
	Platelets (10 ⁹ /L)	112 (75-169)	135 (89-185)	92 (64-141)	0.05
	D-Dimères (µg/mL) ^w	4.0 (3.7-16.0)	8.1 (3.3-16.0)	4.0 (3.9-29.0)	0.798
	Fibrinogen (g/L)	4.4 (2.8-6.0)	6.0 (3.8-7.9)	4.0 (2.7-5.2)	0.005
	aPTT (ratio)	1.7 (1.3-2.4)	1.5 (1.3-2.1)	1.8 (1.2-2.6)	0.382
	Creatinine (mg/L)	9 (5-17)	16 (8-25)	7 (4-14)	0.007
	Bilirubin (mg/L)	7 (5-14)	9 (6-45)	6 (5-7)	0.007
	ASAT (UI/L)	49 (41-87)	61 (40-129)	48 (42-70)	0.239
	ALAT (UI/L)	46 (31-72)	42 (30-63)	49 (34-84)	0.209

CRP (mg/L)	85 (32-220)	153 (22-306)	78 (33-189)	0.56
PCT (ng/mL)	0.6 (0.2-2.5)	1,3 (0.6-7.9)	0.4 (0.2-1.2)	0.018
SOFA Day 7	11 (8-16)	14 (9-18)	10 (8-14)	0.201

Values are number (%) or median (interquartile range). FmO₂=fraction of membrane oxygen. RPM=rate per minute. FiO₂=fraction of inspired oxygen. ACV=assist-control ventilation. APRV=airway pressure release ventilation. PSV=pressure support ventilation. SB=spontaneous breathing. Vt=Tidal volume. Vt IBW=ideal body weight tidal volume. RR=respiratory rate. Ppeak=Peak pressure. Pplat=plateau pressure. PEEP=positive end-expiratory pressure. Compliance RS = respiratory system compliance. aPTT=activated partial thromboplastin time. ASAT=aspartate aminotransferase. ALAT= alanin aminotransferase.

‡1 missing value in second wave group, †1 missing value in second wave group, †1 missing value in second wave group, #1 missing value in second wave group, ‡1 missing value in second wave group, ¶1 missing value in second wave group, ¥1 missing value in second wave group, ¢1 missing value in second wave group, ¤4 missing values in second wave group.

Supplementary Table S4. Treatments under ECMO

Treatments under ECMO	All patients (=50)	First Wave (=24)	Second Wave (=26)	P-value
Adjuvant ARDS treatment				
Prone Positioning	34 (68)	13 (54.2)	21 (80.8)	0.044
Inhaled nitric oxide	33 (66)	13 (54.2)	20 (76.9)	0.09
Almitrine	14 (28)	5 (20.8)	9 (34.6)	0.278
COVID-19 therapies				
Glucocorticoids	44/50 (88)	22/24 (91.7)	22/26 (84.6)	0.669
Antiviral	1 (2)	1 (4.2)	0 (0)	0.48
Immunomodulators	2/50 (4)	2/24 (8.3)	0/26 (0)	0.225
Renal replacement therapy	22 (44)	15 (62.5)	7 (26.9)	0.011
Blood-product transfusion				
Red cells transfusion	49 (98)	24 (100)	25 (96.2)	1
Platelets transfusion	17 (34)	6 (25)	11 (42.3)	0.197
Fresh frozen plasma	14 (28)	5 (20.8)	9 (34.6)	0.278
Fibrinogen concentrate	7 (14)	2 (8.3)	5 (19.2)	0.42

Values are number (%). Antiviral therapies were Lopinavir-Ritonavir, Chloroquine, Remdesivir. Immunomodulators were intravenous immunoglobulin, anti-cytokine, JAK inhibitors.