ECMO in COVID-19 BP patients; single center experience from the middle east.

Authors

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Background

- **Growing reports arguing the value of extracorporeal membrane oxygenation (ECMO) on COVID-19 survival. The earliest studies reported high mortality in small cohorts. International medical organizations still recommended, early in the pandemic, that ECMO should be considered if conventional treatment was not successful.**

Aim of the study

To assess the risk factors associating the outcome of ECMO procedure among critically ill COVID-19 infected patients.

Patients and methods

- **An observational study recruited COVID-19 patients necessitating ECMO support in Kuwait from March 2020 to December 2021. Socio-demographic characters, clinico-laboratory parameters (days of mechanical ventilation before ECMO, routine investigations, LDH, ferritin, D-dimer, blood gases & positive cultures), radiological findings, and different lines of management were recorded.**

Patients and methods

- **Moreover, various complications during ECMO were reported stressing on bleeding / thrombotic events, RBCs / platelet transfusion and acute kidney injury (AKI) on ECMO. Final outcome was recorded :ECMO duration, ICU stay, mortality, and need for ventilatory support post discharge.**

Results

- **The reported survival rate was 58.5%. Non-survivors were older (43.6± 8.7 vs. 38.92 ±8.75 years, p=0.01), predominantly males (p=0.046), had higher mean platelet volume (21.78±7.55 vs. 13.47±8.19, p=0.02), median D-dimer (4312±2146 vs. 2795±1545, p=0.04) and mean CO2 (65.1±25.69 vs. 52.45±24.05, p=0.01). Most of non-survivors (56.9%) had computed tomography (CT) chest findings consistent with COVID-19 (vs. 35.7% among COVID-19unmatched CT) (p=0.028).**

Demographics of the studied patients

	Post-ECMO survivors (N=64) Number %	Post-ECMO non-survivors (n=56) Number %	P value
Age groups			
<40 years	35	19	
40-<60 years	25	34	
>60 years	2	1	0.034
Age in years	37.5±10.9	43.6±8.7	0.006
Sex:			
Male/ Female	35(54.7)/ 29(45.3)	40(71.4) /16(28.6)	0.059
Nationality			
K	34	38	
NK	30	18	0.10
Covid-19 risk factors			
Smoking	0	3	0.06
DM	10	19	0.024
HTN	11	17	0.10
IHD	2	1	0.61
Obesity	4	1	0.20
Kidney function			
Normal	35	39	
AKI	20	20	
CKD	1	2	0.71
Kidney transplant	2	3	0.57
COPD	3	5	0.39

Demographics of the studied patients

CT chest	19	29	0.015
Positive culture			
Sputum	44	39	0.79
Blood	34	32	0.82
Leucocyte count			
Normal	31	36	
Low	8	6	
High	25	14	0.18
Complications			
Shock	35	50	<0.001
Thrombotic events	15	12	0.49
Bleeding events	19	24	0.31
AKI during ECMO	30(65.2)	48(88.9)	0.004
Management			
Steroid	44	45	0.18
Anticoagulation	51	50	0.11
Antiviral	10	10	0.81
Biological therapy	14	5	0.04
Antibacterial	55	49	0.50
Blood transfusion	30	28	0.57
Plasma transfusion	4	5	0.70

laboratory investigations of the studied patients

	Post-ECMO survivors (N=64) Mean ± SD, median	Post-ECMO non-survivors (N=56) Mean ± SD, median	P value
Age in years	37.5±10.9	43.6±8.7	0.006
Platelets	253±168, 245	236.6±112,275	0.51
Mean platelet volume	10.3±2.1	10.3±1.7	0.89
Hemoglobin	87.9±48,103	89.2±52,113	0.89
WBC count	10.8±7.4	6.9±9.2	0.64
Lymphocyte count	9.5±7.9	10.4±7.8	0.55
Serum creatinine	94±98,65.5	95.4±69,72	0.93
Serum sodium	135±18.4, 138	135.2±14,137	0.96
Serum potassium	4.1±0.46,4	4.3±.61	0.23
Lactic dehydrogenase	549.5±353,522	561.4±446,472	0.87
Ferritin	540.7±727,220	811.9±1638,364	0.28
Procalcitonin	15.66±41, 0.5	6.9±30.1,0.33	0.21
C-reactive protein	123.4±86,115	125.4±108,100	0.93
PH	6.92±1.66,7.3	7.3±0.1,7.32	0.114
PCO2	52.8±24	65±25.6	0.014
Po2	68.4±36.7	71±23	0.66
Serum bicarbonate	26.6±8.1	28±8.2	0.39
D dimer	2045±4390, 796	1545±2795,500	0.52
ICU stays in days	31.9±29.8, 28	28.8±25.5,25	0.58

Results

- **Moreover, non-survivors were more likely to be shocked on vasopressor support (50 out of 56 patients) or developed AKI while on ECMO (44 out of 56 patients), ($p < 0.001$, 0.012 respectively). Most patients who were managed by biological agents survived compared to those who did not (75% vs. 49.5% respectively, $p=0.038$). We found a significant positive correlation between ECMO duration, age ($p=0.012$),& LDH ($p=0.041$); between LDH and ICU stay ($p<0.001$); between D-dimer, CRP ($p=0.006$) and PaC02 ($p=0.015$). We found that post-discharge ventilatory support was needed in 48.1% and 11.4% (as O2 supplementation or CPAP, respectively).**

Conclusion

ECMO should be considered for critically ill COVID-19 patients who develop refractory respiratory failure despite standard care.

Keywords: ECMO, Mortality, ICU, COVID-19, Respiratory Failure