

The effect of cytokine adsorption therapy on the outcome of 359 critically ill patients

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Background

Critically ill patients have organ dysfunction and inflammatory dysregulation that can benefit from hemadsorption. Nonetheless, the routine use of this technique in large case series has not been described so far. We evaluated clinical outcomes and survival in high-risk intensive care unit patients.

Methods

We analyzed data from 359 consecutive patients admitted in the ICUs of San Raffaele Hospital from April 2015 to August 2020 and treated with CytoSorb (CytoSorbents Corporation, NJ, USA), a device able to remove molecules in the 5-60 KDa range. CytoSorb was started routinely in all patients receiving extracorporeal life support after cardiac arrest and following assessment of multiple organ failure and inflammatory status in other conditions. The hemoperfusion cartridge (replaced every 24h) was inserted in the extracorporeal membrane oxygenation circuit or a dedicated hemoperfusion pump was used.

Results

Mean age was 61 ± 14.7 and 283 (77%) were male. Main admission diagnoses were: 120 (34%) post cardiac arrest; 101 (28%) cardiogenic shock; 81 (23%) post cardiac surgery; and 37 (10%) respiratory failure.

Fifteen patients (4%) were positive for SARS-CoV2 infection. We recorded a 30-days mortality of 47%, an ICU mortality of 57%, and a hospital mortality of 62%, all lower than the 73% predicted from SAPSII. After 7 days of treatment patients had a reduction in most indicators of shock and organ failure with a remarkable reduction in vasoactive inotropic score. No CytoSorb-related complications were observed.

Table 1. Laboratory values and inotropic score trend in survivors and non survivors

Characteristics	24 h before CytoSorb start	Peak value in ICU	P-value pre-peak	Day 7	P-value peak-day 7
Survivors					
Inotropic score	10 (3-20)	15.3 (10-26)	< 0.01	5 (0-10)	< 0.01
LDH	524.5 (363-921)	661.5 (435-1317)	< 0.01	520.0 (383-842)	< 0.01
CPK	458 (90-1329)	986 (145-5444)	< 0.01	380 (67-2487)	< 0.01
CRP	156.1 (71.8-295.9)	212.2 (126.6-309.1)	< 0.01	111.3 (68.2-183.0)	< 0.01
Total bilirubin	3.27 (0.99-5.53)	3.23 (1.09-6.30)	< 0.01	2.30 (1.05-4.01)	< 0.01
Lactates	2.63 (1.70-7.59)	4.94 (2.29-10.28)	< 0.01	1.83 (1.23-2.38)	< 0.01
Non survivors					
Inotropic score	20 (7-32)	34 (20-60)	< 0.01	20 (8-40)	< 0.01
LDH	656.5 (470-1498)	1401.0 (672-2883)	< 0.01	965.0 (573-1931)	< 0.01
CPK	478 (106-2159)	2965 (462-11816)	< 0.01	1321 (154-5844)	< 0.01
CRP	134.9 (59.0-235.7)	215.5 (116.3-307.4)	< 0.01	149.3 (78.6-232.5)	< 0.01
Total bilirubin	2.70 (0.98-5.32)	3.22 (1.28-7.49)	< 0.01	2.86 (1.11-5.69)	< 0.01
Lactates	4.18 (1.98-11.47)	11.93 (5.15-18.63)	< 0.01	3.69 (2.24-10.23)	< 0.01

Conclusions

Our study confirms the safety and efficacy of CytoSorb in reducing laboratory parameters of shock and the need for inotropic agents with possible survival implications. A patient-tailored approach including extracorporeal circulatory support and extracorporeal purification on top of intensive care to control inflammatory status is key to optimal treatment of critically ill patients.

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