CytoSorb®

Case study of 8 patients with multiple organ failure treated additionally with CytoSorbents haemadsorp- tion as adjunctive therapy in septic shock and severe SIRS in cardiac failure

Kogelmann K, Drüner M, Jarczak D
Department of Anaesthesiology, Hospital Emden, Germany *Infection. 2015 Aug;43 Suppl 1:1-73. Abstract No. 58*

In this case series the authors aimed to investigate the effectiveness of CytoSorb treatment in 8 patients with sepsis/ SIRS and multiple organ failure. They found a pronounced decrease in catecholamine demand and a distinct tendency in decrease of blood lactate levels during the treatment period and within 72 hours after CytoSorb therapy. However, no significant changes for SOFA-Score nor SAPS II-Score were detected. Importantly, compared with overall survival of about 45 % in severe sepsis including septic shock the authors could find a survival of 62.5 % in these patients. Treatment with CytoSorb was safe and without any noticed side effects.

Patients, pre-treatment and indication for CytoSorb treatment

- Seven patients with septic multiple organ failure and one patient with severe SIRS and MOF in cardiac failure treated additionally with CytoSorb as adjunctive therapy in septic shock
- The infectious focus was abdominal (four patients) and pneumonic (three patients), one patient was without any infection
- Initial therapy of these patients followed the Surviving Sepsis guidelines and focused on adequate volume therapy, differentiated catecho- lamine therapy (administering norepinephrine to achieve a mean arterial pressure of 60 mmHg), administering antibiotics not later than 1 hour after detection of septic shock and lung-protective ventilation
- If there was no decline of catecholamine demand even after an additional corticoid treatment for 24 hours, CytoSorb therapy was initiated
- Indication for hemadsorption therapy further included: at least two-organ failure with APACHE-2 Score higher than 25, no decline in requirement of norepinephrine despite adequate conventional therapy over a 24 hours period as well as the need for renal replacement therapy

Treatment

- Duration of therapy with CytoSorb was predefined to be between 24 and 72 hours
- Adsorber was changed every 24 hours

Measurements

- Patient characteristics: sex, age
- APACHE-2 score, ventilator days, length of stay (ICU and in-hospital) and survival
- Before, during and after CytoSorb treatment
- – SAPS II-Score, SOFA-Score, MAP, requirement of norepinephrine, blood lactate level
- Demand of norepinephrine (µg/h vs. mmHg MAP) during therapy

Results

- Five patients were treated over a 72-h period, three patients for 48 h
- Only marginal differences in SAPS II and SOFA- Score:
  – SAPS II-Score at start 51.1 ± 11.74, at the end: 38.6 ± 9.7
  – SOFA-Score at start 11.1 ± 2.85; at the end 9.75 ± 2.2
- Slightly decreased blood lactate [mg/dl]
  – At start 29.2 ± 17.2, at the end: 13.9 ± 7.3
- Huge impact on need for catecholamines with respect to the demand of norepinephrine [µg/h] vs. the thereby achieved MAP [mmHg]
  – At start: 52.7 ± 26.9;
  at the end: 3.6 ± 4.7 [µg/h * mmHg]
- Compared with overall expected survival of about 45 % in severe sepsis including septic shock the authors could find a survival of 62.5 % in these patients

CytoSorb®

Fig. 1 µg Norepinephrine/mmHg MAP

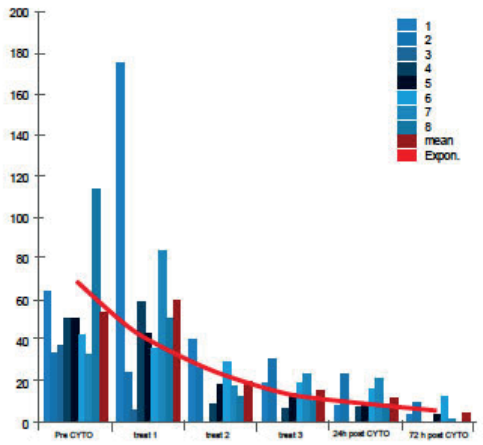

Table 1: Descriptives (MAP=mean arterial pressure, NOR=norepinephrine, LOS=length of stay)

	Minimum	Maximum	Mean	SD
Age (years)	36	80	58.12	14.96
SAPS II-score	36	73	51.12	11.74
SOFA-score	8	46	11.12	2.85
MAP (mmHg)	35	70	59.62	10.87
NOR (µg/h)	2,000	4,000	2,910	720
Lactate (mg/dl)	9.2	53.1	29.20	17.21
Ventilator (days)	16	50	31.12	11.48
LOS ICU (days)	18	71	39	15.62
LOS hospital (days)	43	88	51.17	17.06
APACHE-2 score	27	52	35.62	9.99

Fig. 2 Blood lactate level (mg/dl pre/post Cytosorb treatment)

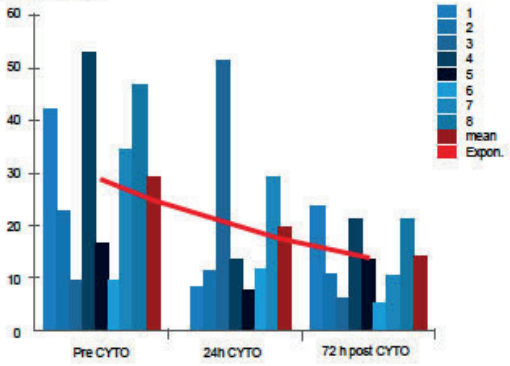

Table 2: Data at the beginning (Start= 1) and after treatment (End = 2) with CytoSorb (MAP=mean arterial pressure, NOR=norepinephrine)

	Minimum	Maximum	Mean	SD
MAP (1) (mmHg)	35	70	59.62	10.87
MAP (2) (mmHg)	65	85	77.5	7.07
NOR (1) (µg/h)	2,000	4,000	2,910	720
NOR (2) (µg/h)	0	1,000	280	390
SOFA-score (1)	8	16	11.12	2.85
SOFA-score (2)	7	14	9.75	2/18
SAPS II-score (1)	36	73	51.12	11.74
SAPS II-score (2)	25	55	38.62	9.73
Lactate (1) (mg/dl)	9.2	53.1	29.2	17.21
Lactate (2) (mg/dl)	4.7	23.9	13.97	7.31
NOR µ/MAP (1) (µg/h * mmHg)	33.25	114.28	52.76	26.96
NOR µ/MAP (2) (µg/h * mmHg)	0	12.50	3.62	4.75

CONCLUSIONS

- Indication for CytoSorb therapy in this case series is comparable to former indication
- for activated recombinant human Protein C (drotegocin alfa activated): at least 2-organ failure with APACHE-2 score higher than 25, no decline in requirement of norepinephrine despite adequate conventional therapy over a 24 hours period
- Treatment with CytoSorb in these 8 patients was safe and without any noticed side effects
- The major effect seen was a pronounced decrease in catecholamine demand
- Compared with overall expected survival of about 45 % in severe sepsis including septic shock the authors could find a survival of 62.5 % in these patients
- Whether other patients could profit from this adjunctive treatment is uncertain and should be investigated