Case study of 8 Patients with multiple organ failure treated additionally with Cytosorbents haemadsorption as adjunctive therapy in septic shock and severe SIRS in cardiac failure

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Introduction: In several studies and in in vitro data is demonstrated that the additional treatment with an extracorporeal cytokine adsorption filter (Cytosorb) may be helpful in patients with septic multiple organ failure due to increased blood cytokine levels by effective removal of toxic cytokine levels (1, 2, 5, 6, 9, 11, 12). Cytosorb treatment can be used as adjunctive therapy not only in septic multiple organ failure but as well as e.g. in severe pancreatitis or other critical diseases due to an excess of cytokines (1). Cytosorb therapy has meanwhile been used in over 200 hospitals worldwide in more than 5500 patients and is well tolerated and safe. Objectives: We collected data from seven Patients with septic multiorgan failure treated additionally with cytokine-haemadsorption filter (Cytosorb) as adjunctive therapy in septic shock and from one patient with severe SIRS and MOF in cardiac failure. The infectious focus was abdominal (four patients) and pneumonic (three patients), one patient was without any infection. The indication for haemadsorption therapy has been: at least two-organ failure with APACHE-2 Score higher than 25, no decline in requirement of norepinephrine despite of adequate conventional therapy over a 24 h period as well as the need for renal replacement therapy. Aim of our case study was to show the effectiveness of Cytosorb treatment used as adjunctive therapy in these cases.

Methods: The initial therapy of these patients followed the Surviving Sepsis guidelines (3, 7) focussed on adequate volume therapy, differentiated catecholamine therapy (administering norepinephrine to achieve a mean arterial pressure [60 mmHg], administering antibiotics not later than 1 h after detection of septic shock, lung-protective ventilation. If there was no decline of catecholamine demand even after an additional corticoid treatment for 24 h, Cytosorb therapy was initiated. Sex, Age, APACHE-2 score, ventilator days, length of stay (ICU and In-hospital) and survival are shown in Table 1. Before treatment, during treatment and after treatment with Cytosorb we calculated or collected APACHE II-Score, SOFA-Score, mean arterial pressure, requirement of norepinephrine, and blood lactate level. Furthermore we calculated the demand of norepinephrine (lg/h vs. mm Hg MAP) during therapy. The duration of therapy with Cytosorb was predefined between 24 and 72 h, filter was changed every 24 h.

Results: 50 percent of the treated patients were female, overall survival was 62.5 percent. Currently two patients still are not discharged from hospital actually (1 at regular ward, 1 intermediate care). Five patients were treated over a 72-h period, three Patients over 48 h. Patient data are shown in Table 1. Mean age was 58.1 years (min 36, max 80, ±14.9), SAPS II-Score: 51.1 (min 36, max 73, ±11.7), SOFA Score: 11.1 (min 8, max 16, ±2.85). Mean APACHE-2 Score was 35.6 (min 27, max 52, ±9.9). Descriptive and data at the beginning of therapy are shown in Table 2. During and after therapy we could only see marginal differences in SAPS II and SOFA-Score (mean at start/end of Cytosorb therapy: SAPS II-Score at start 51.1 ± 11.74, at the end: 38.6 ± 9.7, SOFAScore at start 11.1 ± 2.85; at the end 9.75 ± 2.2). After therapy, slightly decreased blood lactate could be seen (mg/dl, mean) at start: 29.2 ± 17.2, at the end: 13.9 ± 7.3. The effects on catecholamine demand we found were by far greater. To show these effects, we calculated the demand of norepinephrine in lg/h vs. the thereby achieved MAP (mm Hg). Start: 52.7 ± 26.9; End: 3.6 ± 4.7. Data during and after therapy are shown in Table 3 and in Figs. 1 to 4.

Conclusions: In this case-study with 7 septic patients and one patient with severe cardiac failure one effect we could determine was a pronounced decrease in catecholamine demand. Neither SOFA-Score nor SAPS II-Score decreased in treatment period and within 72 h after Cytosorb therapy. Distinct tendency in decrease of blood lactate level could be seen in this period. Generally compared with overall survival at about 45 % in severe sepsis including septic shock (4, 7, 8, 10) we could see survival in our patients of 62.5 %. Treatment with Cytosorb adsorption filter in our patients has been safe and without any noticed side effects. Our indication for Cytosorb therapy is comparable to former indication for activated, recombinant human Protein C (drotrecogin alfalpha) activated: at least 2-organ failure with APACHE-2 Score higher than 25, no decline in requirement of norepinephrine despite of adequate conventional therapy over a 24 h period. Whether other patients could profit by this adjunctive treatment is uncertain and should be investigated.