

Use of CytoSorb in traumatic amputation of the forearm and severe septic shock

Prof. Heinz Steltzer, Alexander Grieb, Karim Mostafa

Anaesthesiology and Intensive Care Medicine, UKH Meidling & Sigmund Freud Private University, Vienna, Austria

This case study reports on a 49-year-old patient, who was admitted to the hospital via helicopter transport after a traumatic amputation of his right forearm.

Case presentation

- While working on a landfill cleaning surfaces with a high pressure cleaner, the air pressure tube caught his arm and his right forearm was cut off at the elbow joint
- The amputate was not damaged macroscopically, however a wide spectrum of various aerobic and anaerobic pathogens was detected in the wound, many of which were multi-resistant. These included, for example, *Aeromonas hydrophila*, an enterotoxin-producing bacterium which is endemic in the American tropics; *Stenotrophomonas maltophilia*, a multi-resistant nosocomial pathogen detected in dialysis fluid; and *Clostridium subterminale*, which has been described in the medical literature only in nine case reports as being pathogenic. This microbiologic diversity was most probably due to the location of the accident being a landfill.
- On admission the patient was treated for shock, followed by X-ray examination and immediate replantation (operation time approx. 8 hours)
- After successful surgery and a well-perfused transplant, the patient was postoperatively transferred to the intensive care unit intubated, ventilated and catecholamine-dependent (0.41 µg/kg/min with a mean arterial pressure of 65 mm/Hg)
- Development of lactic acidosis (3.6 mmol/l)
- Sharp increase in inflammation-relevant parameters (leukocytes 18,700/µl, CRP 13.5 mg/dl, IL-6 539 pg/ml)
- Initiation of antibiotic therapy with 3g sultamicillin
- Administration of hydrocortisone 20 mg/h + 3 Red Packed Blood Cells
- Immediate initiation of continuous renal replacement therapy in combination with CytoSorb because of the anticipated risk of a complex infection due to the accident and the location of the accident (landfill)

Treatment

- A total of 8 treatments with CytoSorb over 8 days with therapy intervals of 24 hours each were carried out (interrupted by surgical procedures)
- CytoSorb was used in combination with CRRT (Multifiltrate, Fresenius Medical Care) in CVHDF mode
- Blood flow: 100 ml/min
- Anticoagulation: Citrate
- CytoSorb Adsorber position: pre-hemofilter

Measurements

- Demand for catecholamines
- Inflammatory parameters (CRP, IL-6, leucocytes)
- Lactate

Results

- Clear improvement in hemodynamics with reduction of catecholamine dosages
- Significant reduction of inflammatory parameters, in particular IL-6 decreased from 1804 pg/ml to 20.1 pg/ml with CytoSorb therapy
- Declining lactate values during the 8 treatments

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb +Amputatio n	CVVHDF+ CytoSorb	CVVHDF+ CytoSorb							
IL-6 [pg/ml]		539,6	1804	1148	1105	408,6	43,3	20,1	117,4	59	32,8	127,5	36,7	29,5	20,9
CRP [mg/dl]	0,1	13,5	34,5	48,6	55,5	50,4	27,8	12,3	8,7	11	10	7,5	10,4	6,6	4,1
Leucocytes [G/L]	12,2	20,4	15,2	9	9,6	9,8	27	20,6	18,6	19,9	17	17,9	15,2	12,1	10,9
Lactate [mmol/l]	2,2	3,6	1,4	1,5	1,7	0,9	0,9	0,8	0,9	0,7	0,6	0,5	0,7	0,6	0,9
Norepinephrin e [µg/kg/min]	0,41		0,04			0,2	0,3	0,06							

Patient Follow-Up

- During the course of the following week development of sepsis with multiple organ failure
- Infection and necrosis of the amputate followed by removal of the necrotic tissue and ultimately amputation of the forearm
- Continuous stabilization and improvement after amputation while still under CytoSorb for two more days
- Daily surgical wound care, disinfection, removal of necrotic tissue
- 18 days after initial admission the patient was transferred to the normal trauma-surgical ward
- Eventual adaptation of a robotic prosthesis and complete recovery of the patient

CONCLUSIONS

- The early treatment with CytoSorb was accompanied by a relatively modest systemic inflammatory reaction which subsided without major or permanent organ damage, despite the impressive pathogen spectrum and the pronounced local damage
- The early and continuous use of the CytoSorb adsorber was easy and safe for the entire staff of the intensive care unit