CytoSorb in a case of severe burn injury (50% TBSA) and Candida tropicalis sepsis and disseminated mucormycosis

Prof. Dr. med. Manu LNG Malbrain, MD, PhD
Ziekenhuis Netwerk Antwerpen, ZNA Stuivenberg, Antwerp, Belgium
University Hospital Brussel (UZB), Jette, Belgium

This case study reports on a 49-year-old female patient who was admitted to hospital with severe burn injury (50% TBSA) and inhalation trauma due to an explosion accident and fire in her kitchen.

**Case presentation**

- Severity scores on admission: APACHE-II 17, SAPS-II 49 and SOFA score 10
- Instantaneous initial treatment with bath therapy, escharotomy on both hands, thorax and abdomen due to deep circular burns grade 3
- Burn resuscitation according to PPV and GEDVI protocol, treatment with cyanokit (lactic acidosis)
- In the further course daily routine dressing changes, in total seven operations with debridement and split skin grafts in the first 3 weeks
  - 27/2/2017: escharotomy thorax
  - 28/2/2017: escharotomy right wrist + abdominal wall because of abdominal compartment syndrome. Afterwards drop in intraabdominal pressure (IAP) from 21 mmHg to 15 mmHg and better oxygenation and ventilation
  - 2/3/2017: avulsion thorax + abdomen + right arm
  - 9/3/2017: avulsion back + backside left arm
  - 14/3/2017: avulsion left forearm
  - 16/3/2017: removal donor skin chest, abdomen and avulsion right arm
  - 17/3/2017: removal donor skin back
- On day 3 after admission development of severe sepsis and septic shock
- Proven microbial species in burn wounds: Initially Escherichia coli, Pseudomonas putida, Enterococcus faecalis, MSSA, Enterobacter cloacae and Candida tropicalis. Later on positive cultures with Serratia marcescens and Citrobacter freundii (tracheal secretion MSSA and Serratia liquefaciens). Late positive cultures with Trichosporon mucoides or mucormycosis (sensitive to voriconazole and amphoterine B). Proven sepsis with positive blood cultures (MSSA, Candida tropicalis)
- Antibiotic therapy with meronem, amphotericin B (initially), voriconazol, vancomycin
- High demand for catecholamines and vasopressors (noradrenaline up to 2 µg/kg/min, adrenaline 1 µg/kg/min, terlipressin 18 mg/d, dobutamine 10 µg/kg/min)
- Mechanical ventilation: BIPAP, high peak inspiratory pressures, high FiO2
- Severely impaired renal function with increased retention parameters and development of anuria
- Significantly elevated inflammatory parameters (CRP 400 mg/l, PCT 47.6 µg/l, WBC 15100/µl)
- Due to the progressive need for catecholamines after avulsions on thorax and abdomen a CytoSorb adsorber was added on day 3 (2/3/2017) together with the CRRT circuit (at that time the patient was still passing urine)

**Treatment**

- Three CytoSorb treatment sessions for three days (day 3, 4 and 10) with treatment time of 24 hours each
- CytoSorb was used in conjunction with CRRT (Aquarius, Dirinco) in CVVH mode
- Blood flow rate: 180 ml/min
- Anticoagulation: citrate
- CytoSorb adsorber position: pre-hemofilter

**Measurements**

- Demand for catecholamines
- Renal function (creatinine, urea, excretion)
- Inflammatory parameters (CRP, PCT, WBC)
Results

- Hemodynamic stabilization of the patient with significantly decreased needs for catecholamines (noradrenaline overnight from 2 µg/kg/min to 0.3 µg/kg/min, adrenaline overnight from 1 µg/kg/min to 0 µg/kg/min, Terlipressin overnight from 18 mg/day to 6 mg/day, dobutamine from 10 µg/kg/min to 3 µg/kg/min).
- Significantly declining renal retention parameters (under CVVH) and reduction of inflammatory parameters (CRP 35.5 mg/l, PCT 0.62 µg/l, WBC 8500/µl)

Patient Follow-Up

- In the further course continuation of intensive care treatment
- Termination of renal replacement therapy was not possible
- Patient stable, but continuous need for renal replacement therapy, mechanical ventilation and low dose vasopressors (noradrenaline 0.15 µg/kg/min)
- Finally, re-occurrence of candida tropicalis sepsis and mucormycosis and multiple organ failure due to anergy, catabolic state and immune deprivation
- Patient died on day 70 after admission (CytoSorb treatments on day 3, day 4 and day 10)

CONCLUSIONS

- Treatment with CytoSorb in the early phase of severe burn injury (day 3-4) resulted in significant stabilization of hemodynamics with declining needs for catecholamines as well as control of the septic episode
- Open questions in the treatment of such patients are the occurrence and selection of yeast infections with Candida tropicalis and mucormycosis (imbalance between DAMPS and PAMPS which favor yeast infections?), as well as the required dose of antifungal drugs
- CytoSorb was safe and easy to apply