The Use of a Cytokine Adsorber (CytoSorb) in a Patient with Septic Shock and Multi-Organ Dysfunction (MODS) after a Severe Burn Injury

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This case study reports on a 21-year-old male patient, who was admitted directly to the hospital from an accident site after an explosion in the home environment with 2b-3-degree burns to 60% of his body surface area.

Case presentation
- Affected were both arms, face, thorax as well as both thighs
- Pre-existing diseases included known epilepsy and multifactorial drug abuse
- The ABSI score (abbreviated burn severity index) was 10 points
- On admission, immediate bath therapy was performed while the patient was still circulatory and hemodynamically stable, with a complete body shave/washing and surgical wound cleaning of the burned areas
- No trauma requiring surgical treatment was detected in the emergency trauma CT
- Bronchoscopy confirmed inhalation trauma grade II
- As a result of burns grade III, escharotomy was performed on both arms and thorax on the day of admission
- Multiple operations were carried out and later, also Meek-transplantations 1: 6 on the lower abdomen, both upper arms, the upper thorax and both forearms
- Furthermore, residual necrotic tissue was removed predominantly from the back and face, using epifascial debridements
- There was a pronounced loss of transplant, as a result cultured keratinocytes (which were obtained early in advance) were used for restoration
- Due to the confirmed inhalation trauma grade II, a Rotorest bedding with dorso-ventral alternating bedding was carried out and an adaptation of the ventilation parameters was performed
- Due to persistently elevated inflammatory (leukocytes, C-reactive protein [CRP] and procalcitonin) and renal function parameters, positive blood cultures and wound smears confirming Acinetobacter baumannii 4MRGN [multiresistant gram-negative pathogen], hemofiltration therapy with additional integration of a CytoSorb adsorber was commenced

Treatment
- Application of CytoSorb from the 9th to the 17th day and from the 32nd to the 52nd day of treatment (28 cycles in total).

Measurements
- Demand for catecholamines
- Parameters of infection (IL-6, IL-10, CRP)
Results

- Interleukins IL-6 and IL-10 significantly reduced during treatment
- Demand for catecholamines was significantly reduced and hemodynamic stabilization could be achieved

Patient Follow-Up

- Due to the persistent infection with Acinetobacter baumannii, the patient was isolated in his therapy box and received an antibiogram-compatible therapy with colistin
- During his further hospitalization, the pulmonary and renal situation of the patient worsened drastically. Chest X-ray control confirmed bilateral pneumothoraces, which were drained
- In addition, regular X-ray controls showed the development of an ARDS [acute respiratory distress syndrome] with respiratory acidosis
- Due to the persistently poor respiratory situation, the medical team considered the use of ECMO [extracorporeal membrane oxygenation], which was rejected later after several conversations and at the request of the family as well as due to the bad prognosis
- The patient died on the 52nd postoperative day of cardiopulmonary insufficiency and multiorgan failure

CONCLUSIONS

- This is the first described case of a standard treatment with the CytoSorb adsorber as an adjuvant therapy for a burn patient with a septic episode
- CytoSorb therapy resulted in a significant reduction in inflammatory mediators (IL-6, IL-10) and catecholamines
- In this patient CytoSorb improved hemodynamics through the proven reduction of norepinephrine and had a significant impact on the survival time of this patient
- Treatment in this patient was safe and well tolerated
- By the early application of CytoSorb, the septic episode in burn patients can be potentially improved and the survival time can be prolonged
- Therefore, the reduction of inflammatory mediators such as cytokines and free hemoglobin by CytoSorb might be a promising approach