

CYTOSORB™ AND TREATMENT OF RESISTANT HEMODYNAMIC SHOCK IN A CASE OF MULTIFACTORIAL CYTOKINE STORM

Gerini U.¹, Bedina E.¹, Bianco F.¹, Berlot G.², Boscutti G.¹
¹ASUITS Division of Nephrology and Dialysis, Department of Internal Medicine, Trieste, Italy
²ASUITS Department of Perioperative Medicine, Intensive Care and Emergency Medicine, Trieste, Italy

REGIONE AUTONOMA FRIULI VENEZIA GIULIA
Azienda Sanitaria Universitaria Integrata di Trieste



BACKGROUND

The Cytosorb™ cartridge contains an adsorbent filter capable of modulating the cytokines which characterize many pathological states [1]; the principal applications of Cytosorb™ are found in sepsis and septic shock [2]. The experience in the use of Cytosorb™ in cases of pathological systemic inflammation is limited in the absence of infection [3]. We report herein a complex case of pathological systemic inflammation (Systemic Inflammatory Response Syndrome -- SIRS) in an immunosuppressed patient affected by rheumatoid arthritis (RA) who was treated with Cytosorb™ hemoadsorption.

METHODS

The patient was a 64-year-old woman affected by RA treated with methotrexate and anti-TNF-alpha antibodies (Infliximab). She presented to the emergency department with fever, hypotension and hematuria. Laboratory exams revealed: urea 61 mg/dl, creatinine 1.53 mg/dl, pH 7.42, HCO₃ 20 mmol/l, lactate 14.1 mg/dl, hemoglobin 9.5 g/dl, C-reactive protein 306 mg/L, WBC 11.510/mcl. Abdominal CT and cystography demonstrated a lesion of the bladder wall; bilateral ureteral stents were placed. She was treated with fluid infusions, inotropes, empiric antibiotic therapy with piperacillin/tazobactam and metronidazole, without significant improvement of hemodynamic or laboratory parameters. For the persistence of renal insufficiency and hypotension in the apparent absence of infection (negative urine culture), we initiated continuous renal replacement therapy (CRRT) in the form of venovenous hemofiltration (CVVH) associated with hemadsorption with the Cytosorb™ filter. CVVH was performed in pre-dilution, using heparin 500-750 UI/h anticoagulation. Due to recurrent coagulation of the circuit the Cytosorb™ filter was replaced three times, and thus the total duration of adsorption was about 40 hours.

RESULTS

After beginning the adsorptive and dialytic treatment we observed a progressive improvement of the hemodynamic condition and an increase of the hourly urine output which allowed for the reduction and eventual discontinuation of the noradrenaline (NE) dose [Fig. 1].

The patient was transferred from the intensive care unit four days following the end of the Cytosorb™ treatment.

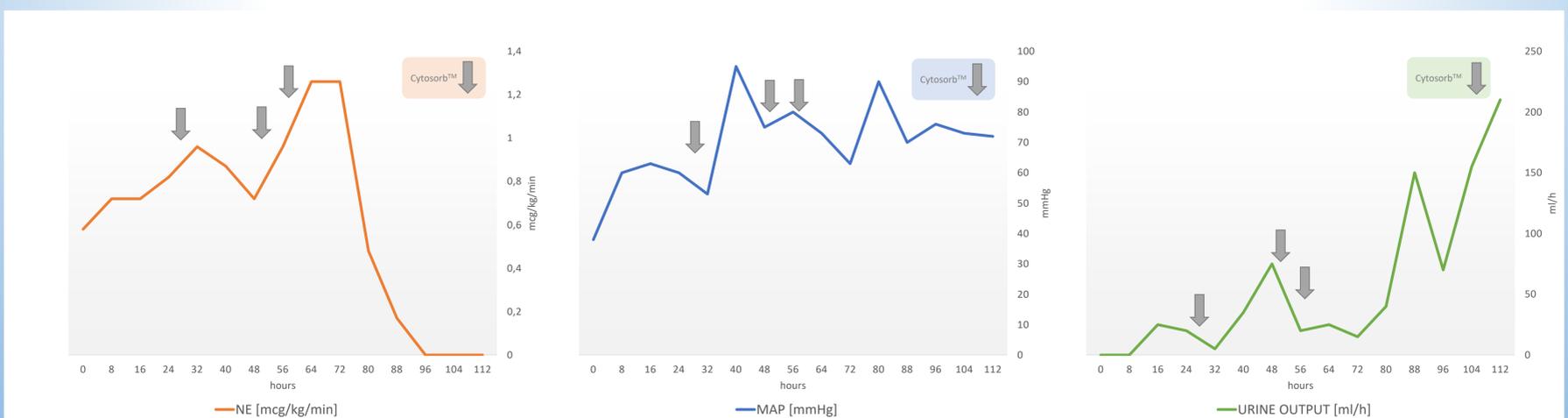


Figure 1. Trends in norepinephrine administered dose (NE), mean arterial pressure (MAP), and urine output before and after Cytosorb™ treatment. Grey arrow indicates replacement of Cytosorb™ cartridge.

CONCLUSIONS

This report describes the application of Cytosorb™ in a complex case of SIRS of unknown origin in a patient with underlying autoimmune disease, immunosuppression and lesion of the bladder wall. Given the clear clinical response after treatment with the CVVH/Cytosorb™ treatment, we hypothesize that the immunomodulation produced by cytokine adsorption allowed a rapid restoration of cytokine and hemodynamic equilibrium. Thus, Cytosorb™ constitutes a useful technique in the management of SIRS, also when the clinical picture is not apparently explained by infection.

BIBLIOGRAPHY

- [1] Bonavia, A., Groff, A., Karamchandani, K., & Singbartl, K. (2018). *Clinical Utility of Extracorporeal Cytokine Hemoadsorption Therapy: A Literature Review. Blood Purification, 337–349.*
- [2] Poli, E.C., Rimmelé, T., & Schneider, A.G. (2018). *Hemoadsorption with CytoSorb®. Intensive Care Medicine, 45(2):236-239.*
- [3] Winchester, J. F., Kellum, J. A., Ronco, C., Brady, J. A., Quartararo, P. J., Salsberg, J. A., & Levin, N. W. (2003). *Sorbents in Acute Renal Failure and the Systemic Inflammatory Response Syndrome. Blood Purification, 21(1), 79–84*