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Case of the week 26/2021

Use of extracorporeal hemoadsorption in septic shock due to liver abscesses in the context of PSC recurrence post liver transplantation

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This case reports on a 54-year-old male patient who was treated in the medical intensive care unit at Aachen University Hospital following a generalized tonic-clonic seizure with subsequent postictal vigilance reduction in the context of septic encephalopathy.

Case presentation

- Medical history included primary sclerosing cholangitis (PSC) and ulcerative colitis as well as surgical placement of a biliodigestive anastomosis (BDA) and cholecystectomy for benign choledochal stenosis in the hepatic hilus (1993), revision of the BDA (2000), and orthotopic liver transplantation (2011). Following transplantation, recurrent liver fibrosis occurred in the context of a PSC relapse
- Previously, the patient had been diagnosed with size-progressive left hepatic, non-malignant hypodense lesions by means of computed tomography at another hospital. A sonography-guided puncture of the liver lesions had been performed resulting in the suspected diagnosis of a putrid liver abscesses
- Post-intervention, the patient was hypotensive and had a generalized tonic-clonic seizure for 60 seconds, followed by marked postictal decrease in vigilance. A pronounced metabolic acidosis (lactate 8 mmol/l) was detected postictally. Immediate emergency stabilization was performed followed by admission to the intensive care unit (ICU)
- On admission, the patient was awake, breathing spontaneously and hypotensive. Over time, he became increasingly hemodynamically unstable with rapidly increasing needs for norepinephrine. Advanced hemodynamic monitoring was established by means of transpulmonary thermodilution. Serological infection parameters increased progressively. As a result of a septic spread presumably from the putrid abscesses, the patient developed a septic shock with pronounced capillary leakage syndrome (Systemic Vascular Resistance Index (SVRI) 621 dyn*s*cm^5*m^2, extravascular lung water index (ELWI) 12 ml/kg), metabolic derangement and marked intravascular volume deficiency requiring pronounced positive balancing
- Due to progressive respiratory insufficiency (paO_2 65 mmHg under 10 litres O_2 via nasal cannula, $paCO_2$ 24.4 mmHg) endotracheal intubation was performed without complications
- Anti-infective therapy with piperacillin/tazobactam and linezolid was escalated to meropenem and linezolid
- Due to progressive development of acute-on-chronic renal failure, markedly elevated vasopressor requirements (up to 0.56 µg/kg/min norepinephrine and vasopressin 0.04 IU/h/kg) and clear evidence of a pronounced hyperinflammatory state (C-Reactive Protein - CRP 206.2 mg/l; procalcitonin - PCT >100 ng/ml; interleukin – IL-6 >250. 000 pg/ml, IL-8 >7,500 pg/ml), continuous renal replacement therapy (CRRT) together with extracorporeal CytoSorb hemoadsorption therapy was established
- On the following day of ICU admission, a drainage system was inserted into the liver abscesses for focal infectious source control. Escherichia coli (3MRGN) was detected in the blood and abscess cultures. Therapy with a carbapenem was continued according to the resistogram

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Treatment

- A total of 6 consecutive treatments with CytoSorb were performed for a total treatment period of 72 hours (each treatment 12 hours)
- CytoSorb was used in combination with CRRT (multiFiltratePRO®, Fresenius Medical Care) run in CVVHD mode
- Blood flow rate: 100-150 ml/min
- Dialysate flow: 2000 ml/h
- Anticoagulation: citrate
- CytoSorb adsorber position: pre-hemofilter

Measurements

- Continuous, invasive monitoring of hemodynamics and assessment of vasopressor dosages
- Standard clinical chemistry parameters and laboratory diagnostics (bilirubin, transaminases, electrolytes, renal and retention parameters)
- Monitoring of the inflammatory micromilieu (cytokine concentrations)
- Continuous monitoring of differentiated, lung-protective ventilation parameters and blood gas concentrations

Results

- Combined treatment resulted in a progressive hemodynamic stabilization and both norepinephrine and vasopressin dosages could be continuously reduced and completely stopped after 6 days
- Treatment was also associated with a control in the hyperinflammation as evidenced by a clear reduction in inflammatory parameters (PCT 15.70 pg/ml, IL-6 1416 pg/ml)
- Lactate plasma concentrations were significantly reduced and reached 1.6 mmol/l at the end of treatment
- Combined treatment with differentiated lung protective ventilation, renal replacement and hemoadsorption therapy led to improved lung function (PaO_2/FiO_2) and capillary leakage parameters (ELWI 10 ml/kg, SVRI 1221 $dyn*s*cm^5*m^2$)

Patient Follow-up

- Due to a pronounced right pleural effusion, the patient had right pleural drainage 3 days after the cessation of CytoSorb treatment
- Extubation of the patient was possible the following day

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Conclusions

- In this patient with septic shock due to liver abscesses in the setting of recurrent primary sclerosing cholangitis, combined treatment with state of the art standard therapy, renal replacement and hemoadsorption therapy was associated with a significant stabilization in hemodynamics accompanied by a reduction of norepinephrine and vasopressin dosages, control of the hyperinflammatory situation as well as resolution of metabolic acidosis and general improvement of the clinical condition
- According to the treating intensive care physicians, the combined use of the latest intensive care standard therapy and novel hemoadsorption procedure was clearly the right decision in this case for rapid clinical stabilization and re-compensation. The initially extremely high serological concentrations of markers of the cytological and humoral immune response clearly correlated with the clinical presentation of the patient
- The optimal timing of use and the clinical effects of extracorporeal haemoadsorption in hyperinflammation should be further investigated in controlled studies
- Treatment with CytoSorb was safe and feasible without any technical problems