CytoSorb®

CytoSorb in rhabdomyolysis of unclear origin

A. Dick, K. Alsafadi, Dr. med. J. Ibrahim, O. Terrones, Dr. med. M. Rennicke, A. Semyonova,I.Veil, Prof. Dr. Rüdiger Becker
Internal Intensive Care Unit of the Medical Clinic I, Hospital Wolfsburg, Germany

This case study reports on a 21-year-old male patient who was admitted to hospital via emergency ambulance with a suspected generalized epileptic seizure, after he accidentally fell in the bathroom and was subsequently found groaning in bed with retrograde amnesia.

Case presentation

- Direct admission to the neurological ward (stroke unit)
- At this time the patient was asymptomatic with normal renal function (creatinine 97 µmol/l, GFR 84.2 ml/min, urea 4.4 mmol/l), but he already had a slightly increased creatine kinase (CK) of 488 U/l (CK-MB proportion 28 U/l)
- On day 3 after admission creatine kinase increased to 82,491 U/l (CK-MB proportion 434 U/l)
- The patient was then referred to the cardiology department with suspected cardiac infarction and laboratory data were again taken. These showed a severe deterioration in the renal function (creatinine 447 µmol/l, GFR 14.4 ml/min, urea 11.8 mmol/l) and a further increase in the creatine kinase level to 90,713 U/l (CK-MB proportion 485 U / L)
- Patient was transferred to the internal intensive care unit and plasma myoglobin levels were determined (> 3000 µg/l)
- Despite highly elevated rhabdomyolysis parameters, the patient was still clinically asymptomatic, hemodynamically and respiratory stable, awake, responsive, and after a vigorous fluid administration there even was a temporary recovery of diuresis
- Repeated blood tests indicated established renal failure (creatinine at 417 µmol/l, GFR of 15.7 ml/min, urea 11.3 mmol / l, but no signs of hypercalcemia or of acidosis), and also a noticeable impairment in the liver function (LDH 2051 U/l, GOT 510 U/ l) with ongoing elevated rhabdomyolysis parameters (creatine kinase at 82,552 U/l (CK-MB portion 512 U/l), myoglobin> 3000 µg/l)
- Due to his massive rhabdomyolysis and concerns of sustained renal damage as well as the presumption that a conservative forced diuretic therapy (with Na-bicarbonate, furosemide & volume) might work too slowly, CytoSorb was initiated simultaneously with renal replacement therapy

Treatment

- 3 CytoSorb treatment sessions for a total of 60 hours (1st treatment 20 hours, 2nd treatment 24 hours, 3rd treatment 15 hours)
- CytoSorb was used in conjunction with CRRT (Octonova; Diamed) in CVVHD mode
- Blood flow rate: 200 ml/min
- Anticoagulation: heparin
- CytoSorb adsorber position: post-hemofilter

CytoSorb®

Measurements

- Rhabdomyolysis parameters (creatine kinase, myoglobin)
- Renal function (GFR, creatinine, urea)
- Markers of impaired liver integrity (LDH, GOT)

Results

- The first measurement about 2 hours after initiation of therapy showed a reduction in the plasma concentration of CK to 79,086 U/l (CK MB content 527 U/l), stable myoglobin (> 3000 µg/l) and LDH values (2253 U/L), and a slight improvement in renal function (creatinine 325 µmol/l, GFR 20.9 ml/min)
- 9 hours after the start of therapy, renal function had recovered further (creatinine 219 µmol/l, GFR 32.9 ml/min, urea back within the normal range), however there was an increase in CK to 85,131 U/l (CK MB- Portion 523 U/l)
- Despite the suspicion of potential adsorber saturation, the decision was made not to change the adsorber at that point. After 18 hours, this decision was proven correct with CK values dropping to 56,604 U/l (CK MB content 243 U/l), myoglobin 1400 µg/l and a further improvement in renal function and retention parameters (GFR 46.9 ml/min , creatinine 161 µmol/l)
- 6 hours after the start of the second treatment, CK values could be further decreased to 38,234 U/l (CK MB portion 249 U/l), and after another 9 hours of running time to 24,680 U/l (CK MB portion 171 U/l)
- At this time hepatic (LDH 418 U/l, GOT 310 U/l) and renal function (creatinine 125 µmol/l, GFR 62.9 ml/min) also improved markedly
- After completion of the 15-hour (3rd) therapy session CK was 8965 U/l (CK MB proportion 72 U l), myoglobin 1,117 µg/l, and LDH of 255 U/l
- Only 1.5 hours after completion of the 3rd CytoSorb treatment, the renal function had already started to deteriorate again (creatinine at 132 µmol/l, GFR 59 ml/min)

Patient Follow-Up

- Termination of renal replacement therapy together with the last CytoSorb treatment
- Further diuretic therapy with 40 mg/h of furosemide and continuously falling rhabdomyolysis parameters
- 3 days after the last CytoSorb treatment the patient was transferred to the peripheral internal-cardiology ward and later to a peripheral neurological ward. At this time CK levels were at 1325 U/l, myoglobin 393 µg/l, creatinine 151 µmol/l, and GFR at 50 ml/min
- A progressive thrombocytopenia developed during the CytoSorb-/CVVHD-treatment session (thrombocytes dropped from 209.000/µl to a minimum of 82.000/µl),
- From the laboratory values there was no evidence for haemolysis, heparin-induced thrombocytopenia nor for thrombotic microangiopathy
- After termination of CytoSorb-/CVVHD-therapy thrombocytes spontaneously reversed to normal values
- The following picture emerged during search for the final diagnosis: Screening for antibodies (ANA, pANCA, cANCA, dsDNA) - negative, drug screening in urine - negative, alcohol level - negative, screening for IgG, IgM (toxoplasmosis) – negative
- Screening for aldolase antibodies was positive
- Final diagnosis: Rhabdomyolysis of unclear origin (possibly indicative of an underlying muscular dystrophy disease (late type) , which has to be confirmed by further tests

CONCLUSIONS

- According to the medical team, the patient benefited considerably from the combined CytoSorb/CVVHD therapy, rhabdomyolysis parameters could be significantly reduced and renal function was maintained. A purely conservative treatment might have led to a permanent impairment of renal function.
- Handling of the adsorber was easy and safe