

Case Report: Prevention of Rhabdomyolysis-Associated Acute Kidney Injury by Extracorporeal Blood Purification with CytoSorb®

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This case reports on a 12-year-old boy, who was hit by a motorcycle while riding his bicycle. The motorcycle ran over the boy's legs causing an open wound in the right groin with massive bleeding.

Case presentation

- Upon arrival of the ambulance and emergency physician the boy was in hemorrhagic shock
- The bleeding was compressed manually, intravenous access obtained, 500 mls of crystalloid fluids and 500 mg of tranexamic acid were administered, and the patient transported to the hospital
- A contrast enhanced whole body CT scan was performed in the emergency department which revealed a dissection of the right common femoral artery and laceration of the common femoral vein; peripheral pulses were not palpable
- The patient was intubated and taken to the operating theater for vascular surgery; a femoral-femoral bypass with a saphenous graft was made and the common femoral vein, which was found to be completely disrupted, was ligated proximally and distally
- A medial and lateral fasciotomy was performed in the lower leg to prevent compartment syndrome
- The time from the accident to leg reperfusion was estimated to be 3.5 h
- Postoperatively the patient was admitted to the intensive care unit (ICU) and extubated after a few hours
- On Doppler ultrasound a normal, triphasic flow profile was found down to the distal tibial and peroneal artery
- Over the next few hours a massive rhabdomyolysis developed with creatinine kinase (CK) and myoglobin values reaching a peak of >42,670 U/l (upper limit of laboratory detection) and >12,000 µg/l (upper limit of laboratory detection), respectively
- Balanced crystalloid fluids were administered intravenously to maintain a urinary output of about 200 mls per hours
- Despite still normal values of serum creatinine and urea as well as preserved diuresis, the authors decided to initiate continuous renal replacement therapy (CRRT)
- With the rationale to eliminate myoglobin and prevent acute kidney injury (AKI), a CytoSorb hemoadsorption cartridge was additionally integrated into the CRRT circuit

Treatment

- Two treatments with CytoSorb were performed separated with a pause interval of 16 hours (both treatments for 24 hours)
- CytoSorb was used in combination with CRRT (Prismaflex System, Baxter, Germany) run in Continuous Venous-Hemodiafiltration (CVVHDF) mode
- Blood flow rate: 150 mls/min
- Dialysate flow rate: 500 mls/hour
- Substitution flow rate: 1,000 mls/hour
- Anticoagulation: regional citrate anticoagulation (RCA)

Measurements

- Myoglobin and CK plasma levels
- Creatinine and urea plasma levels

Results

- Twelve hours after the initiation of CVVHDF plus CytoSorb, CK and myoglobin had substantially decreased, yet, during the subsequent 12 h of extracorporeal treatment an increase in both parameters was noted. Following the 16 hours pause interval and a continued increase in CK and myoglobin levels, a second cycle of CVVHDF plus CytoSorb was started and continued for another 24 resulting in a marked decrease in both CK and myoglobin values with a continued decrease even after discontinuation of extracorporeal therapy
- Serum creatinine and urea remained in the normal range also after termination of extracorporeal treatment

Patient Follow-up

- The length of stay in the ICU was 10 days, whereafter the patient was transferred to the surgical ward
- After another 22 days he was discharged from the hospital

Conclusion

- This is the first publication presenting the preventative use of CytoSorb in severe rhabdomyolysis with CytoSorb being started (together with continuous renal replacement therapy) despite normal values of serum creatinine, urea and preserved diuresis, with the target being to prevent AKI via myoglobin removal
- The authors conclude that the early use of extracorporeal myoglobin removal with CytoSorb after severe rhabdomyolysis might be a useful option and should be further investigated as a tool to prevent the development of AKI