

## Use of CytoSorb in a patient with neuroleptic malignant syndrome, rhabdomyolysis and acute renal failure

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*This report describes the case of a 39-year-old female patient, who was admitted to the Emergency Department with psychomotor agitation (hyperactivity) and high fever (39°C).*

### Case presentation:

- Known medical history included intellectual disability and febrile seizures during childhood
- On admission, paracetamol and haloperidol were administered with partial resolution of symptoms
- She was then transferred to the psychiatric ward
- During her stay, multiple neuroleptics were administered including carbamazepine, alprazolam, clozapine, quetiapine and flufenazine. In addition, paracetamol was also administered to treat the pyrexia
- After the first 24 hours her clinical condition progressively deteriorated, the patient showed an altered mental status, respiratory failure, fever, and imminent renal failure
- Due to hemodynamic instability she was admitted to the intensive care unit (ICU) followed by intubation and subsequent mechanical ventilation
- Moreover, broad-spectrum antibiotics were prescribed (piperacillin/tazobactam)
- As her clinical presentation was typical for intoxication with neuroleptics including an altered mental status, hyperthermia, reduction in renal function culminating in anuria and a dramatic increase in myoglobin (> 4000 ng/ml, upper limit of detection), neuroleptic malignant syndrome (NMS) was considered as the main cause of symptoms and differential diagnosis was performed to exclude central nervous system infection, heat stroke and extrapyramidal syndrome
- When admitted to the ICU and in order to avoid profound renal damage, bicarbonate was administered for urine alkalization, diuresis was stimulated with furosemide and crystalloids were infused to support her vascular volume
- Initiation of norepinephrine administration for hemodynamic stabilization
- Despite exhausted treatment modalities, anuria persisted and hyperthermia was refractory to paracetamol, and despite physical cooling, her core temperature reached levels of 41.1°C
- Continuous veno-venous hemodiafiltration (CVVHDF) was commenced with the rationale to lower her body core temperature and to avoid further renal damage
- After consultation with the National Poison Centre neuroleptics were discontinued and it was suggested that administration of dantrolene should be started if hyperthermia did not improve after initiation of CVVHDF
- During the first three days of CVVHDF, her temperature improved (37°C). However, serum myoglobin and creatine-phospho-kinase (CPK) levels remained high
- Moreover, anuria persisted despite continuous administration of diuretics, adequate fluid resuscitation and a maintained mean arterial pressure

- Given the critical condition, four cycles of plasmapheresis were initiated in an attempt to partially reduce serum myoglobin levels, however this had no effect
- On day 10 of her ICU stay, a CytoSorb absorber was then installed into the running CVHDF circuit to reduce myoglobin plasma concentrations and to support regular therapy

### Treatment

- Two consecutive treatment cycles with CytoSorb for a total treatment period of 96 hours (48 hours per treatment)
- CytoSorb was used with CRRT (Multifiltrate, Fresenius Medical Care) and run in CVHDF mode
- Blood flow rate: 100 ml/min
- Anticoagulation: regional anticoagulation using calcium citrate
- CytoSorb absorber position: pre-hemofilter

### Measurements

- Hemodynamics and vasopressor requirement
- Myoglobin levels
- Renal function

### Results

- Treatment was associated with an improvement in hemodynamics and a concomitant reduction in vasopressor requirements
- During CytoSorb treatment serum myoglobin levels gradually decreased to 567 ng/ml over time
- Diuresis returned on day 20 and it gradually increased until her discharge from ICU

### Patient Follow-Up

- The patient was extubated successfully on day 24 after admission
- She was then discharged into a rehabilitation ward and finally made a full renal recovery

### Conclusion

- In this case of neuroleptic malignant syndrome, rhabdomyolysis and acute renal failure, the combination of standard therapeutic interventions, CRRT and CytoSorb as an adjunctive therapy resulted in an improvement in the hemodynamic situation, a reduction in myoglobin plasma levels and a recovery of the renal function
- This case emphasizes another potential indication for CytoSorb in a rare but severe syndrome such as neuroleptic malignant syndrome
- Treatment with CytoSorb in combination with CRRT was both safe and easy to perform