

Use of CytoSorb in a patient with rat poison intoxication with multiple organ failure

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This case reports on a 52-year-old male patient who was admitted unconscious into the emergency department with signs of hypotension, tachycardia, fever and arrhythmia most probably due to imbibement of aluminium phosphide in a suicide attempt.

Case Presentation:

- The patient was referred from a tertiary care centre to the Dhanavatri Multi Speciality Hospital as it is the expert centre for the management of ratol (commonly used domestic rat poison in India) poisoning
- After arrival, he was directly admitted to the intensive care unit
- Past medical history included hypertension and he was also known to have previously consumed aluminium phosphide in a previous suicide attempt
- Radiological examination showed areas of consolidation with minimal atelectasis in both lung fields and bilateral pleural effusion
- Arterial blood gas analysis revealed increased plasma lactate levels (2.3 mmol/L) and a deranged oxygenation
- Due to his current symptoms, gastrointestinal decontamination was performed by gastric lavage with potassium permanganate (KMnO₄) solution
- Laboratory parameters indicated severe leucocytosis, elevated plasma bilirubin concentrations (6.12 mg/dl), and increased inflammatory parameters (PCT 9.0 ng/ml, CRP 64 mg/L, IL-6 200 ng/ml)
- APACHE II score was 18 and SOFA score 13
- Due to metabolic acidosis, the patient was given non-invasive mechanical ventilation
- As the patient became progressively hemodynamically unstable, administration of multiple catecholamines and inotropes (norepinephrine, vasopressin, dobutamine) was started
- The working diagnosis of his condition was acute hyperinflammatory response due to poisoning of aluminium phosphide consumed in high quantities
- Administration of antibiotic therapy (piperacillin/tazobactam 4.5g IV) and initiation of adequate fluid resuscitation
- An Intra-Aortic Balloon Pump (IABP) was installed. However, as the ejection fraction did not improve with IABP, veno-arterial Extra Corporeal Membrane Oxygenator (VA-ECMO) was implanted
- Over the following hours the patient was not responding to standard of care management with further development of multiple organ dysfunction syndrome, so the decision was made to start renal replacement therapy (RRT) in combination with CytoSorb treatment to regain control of the patients hyperinflammatory systemic response

Treatment

- Three CytoSorb treatments were performed for 24 hours each, separated by a pause interval of 1-2 hrs between the sessions
- The first CytoSorb session was run in combination with renal replacement therapy (RRT with hemofilter, CytoSorb in pre-dialyzer setup) using the Diapact dialysis machine (Diapact, BBraun), the second and third CytoSorb session were run in standalone mode only

- Blood flow rate: 150 ml/min
- No anticoagulation was used

Measurements

- Hemodynamics, requirement for vasopressors and inotropes
- Inflammatory status
- Lactate
- Bilirubin
- Severity scores

Results

- There was an increase in mean arterial pressure from 62 to 96 mmHg throughout the treatment cycles accompanied by a marked reduction in vasopressor and inotrope requirements (pre and post treatment levels: vasopressin from 0.5 IU/min to 0.12 IU/min, dobutamine from 10.4 µg/min to 2 µg/min, norepinephrine from 0.16 µg/min to 0.05 µg/min)
- Treatment resulted in an improvement in the inflammatory condition as indicated by a marked reduction in PCT (9.0 to 1.0 pg/ml), IL-6 (from 200 to 14.8 ng/ml), CRP (from 64 to 1.83 ng/ml) and a normalization of leukocyte count (11480/µl)
- Increased plasma lactate levels normalized from 2.5 to 1.1 mmol/l and bilirubin values were also markedly decreased
- During the course of treatment, SOFA score decreased to 9

Patient Follow-Up

- Over the next days the patient further stabilized with a concomitant normalization of the inflammatory condition
- VA ECMO was stopped during the last CytoSorb session
- The patient was weaned off the ventilator by day 10 and was discharged from the hospital on day 14

Conclusion

- This is the first case study reported in the use of CytoSorb therapy in a patient with aluminium phosphide poisoning and hyperinflammation with consecutive multiple organ failure
- Treatment along with the standard of care proved very effective in regaining control of the hyper-inflammatory response, hemodynamic stabilization and improvement in organ functions and clinical parameters
- CytoSorb seems to represent a viable tool in intoxications as it exhibits some additional beneficial immunomodulatory properties even when a direct detoxification effect is unclear or not given