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Case of the week 29/2022

Use of CytoSorb in a post kidney transplant pediatric patient with acute respiratory failure and sepsis

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This case reports on a 13-year-old girl from Bangladesh, who was admitted to the hospital with incipient renal failure and hypertension.

Case presentation

- At the age of 9 months, she had been diagnosed with steroid resistant nephrotic syndrome secondary to WT1 mutation. She slowly progressed to end-stage renal disease and underwent bilateral nephrectomy and initiation of chronic peritoneal dialysis. Kidney transplantation was performed within 6 months (February, 2014), where the donor was the child's mother. The patient was then on regular follow-ups in India until the current renal deterioration happened
- On admission, the patient was found to have a creatinine of 2.5 mg/dl along with severe hypertension for which the patient was put on multiple anti-hypertensive drug therapy. A transplant renal biopsy was performed suggesting thrombotic microangiopathy. In view of her deteriorating renal function, the patient was prepared for renal replacement therapy (Perma-catheter insertion for hemodialysis)
- Following admission, the patient's condition deteriorated including epistaxis, dyspnoea, tachycardia, desaturation on room air and altered sensorium with increasing respiratory distress
- Laboratory investigations revealed a leucocyte count of 13,700/µl, 91% neutrophils, platelets 0.85 lacs/cumm, C-reactive protein (CRP) 29.7mg/dl, INR of 4, aPTT of 120 secs, urea 142 mg/dl, and creatinine 4.1mg/dl
- A subsequent chest X-ray showed patchy consolidations in the right perihilar region
- She went on to develop hemodynamic instability with a drop in mean arterial pressure to 60 mmHg requiring initiation of vasopressor therapy (norepinephrine 0.8 µg/kg/min, epinephrine 0.5 µg/kg/min)
- Additionally, the patient was intubated and put on mechanical ventilation with high ventilator settings including a positive end-expiratory pressure (PEEP) of 13 cmH2O, a peak inspiratory pressure (PIP) of 42 cmH2O, an FiO2 of 100% and a tidal volume of 5 ml/kg
- Intravenous antibiotics were administered
- Hemodialysis was initiated but had to be discontinued due to hypotension and the renal replacement therapy (RRT) modality was switched to Sustained Low Efficiency Dialysis (SLED)
- As the patient was unresponsive to standard therapy and due to the ongoing clinical deterioration along with increased inflammatory markers (D-Dimer 2524.6 ng/ml, IL-6 5000 pg/ml), the decision was made to additionally integrate a CytoSorb hemoadsorber in order to control the hyperinflammatory response and to stabilize the patient hemodynamically

Treatment

- One CytoSorb therapy session was performed for 8 hours on day 1
- CytoSorb was used in conjunction with SLED therapy

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Measurements

- Hemodynamics and vasopressor requirements
- Inflammatory markers
- Ventilation invasiveness and oxygenation

Results

- CytoSorb treatment resulted in a considerable improvement in the patient's hemodynamic situation. 24 hours after initiation of therapy, norepinephrine had already decreased to 0.5 µg/kg/min and epinephrine to 0.1 µg/kg/min and continued to decrease also after cessation of CytoSorb therapy
- Treatment with CytoSorb was further associated with a marked reduction in IL-6 (decrease from >5000 pg/ml to 44 pg/ml over the following 24 hours), indicating a clear control of the hyperinflammatory situation
- Moreover, ventilation invasiveness decreased, and oxygenation improved

Patient Follow-up

- RRT was continued for several consecutive days along with other supportive management
- As the patient improved clinically, she was extubated on day 4 and kept on high flow oxygen therapy via nasal cannula
- Antibiotic therapy was initiated for 14 days as the blood cultures were positive for Staphylococcus epidermidis (Coagulase-Negative Staphylococci)
- The patient was finally discharged in a clinically stable condition with a follow-up plan for intermittent hemodialysis

Conclusion

- In this case of a post kidney transplant pediatric patient with acute respiratory failure and sepsis, the use of CytoSorb hemoadsorption in combination with renal replacement therapy and standard therapeutic measures resulted in rapid hemodynamic stabilization, control of the hyperinflammatory response as well as improvement in ventilation invasiveness and oxygenation
- Hemoadsorption therapy may therefore be a potentially important advance in the control of such conditions, if instituted early and judiciously. The presented case successfully adds to the growing experience from eastern India as the first case of pediatric hemoadsorption therapy
- Use of CytoSorb in combination with SLED was safe and easy