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Case of the week 37/2022

Use of CytoSorb in a patient with ischemia-reperfusion injury, hemorrhagic shock and hyperbilirubinemia following liver transplantation

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This case reports on a 55-year-old man with hepatocellular carcinoma in the context of a hepatitis C virus (HCV)-infection since the year 2000, who was hospitalized and scheduled for an elective orthotopic liver transplantation.

Case presentation

- The transplanted organ was a donation after brain death (DBD) graft. Total ischemic time of the graft was 540 mins
- With the patient's elevated body mass index (BMI), the intraoperative phase proved surgically difficult. Due to hemorrhagic shock, the patient required multiple transfusions and high dose vasopressor therapy
- During the first postoperative day (POD) in Intensive Care Unit (ICU), the patient continued to have severe hemodynamic instability, requiring high doses of norepinephrine (0.6 µg/kg/min), epinephrine (0.5 µg/kg/min) as well as vasopressin
- In the first hours after liver transplantation, ultrasound controls showed a subcapsular echogenic area of 5cm x 3cm x 2.5cm, which was then found by computed tomography (CT) to be an even more extended ischemic area. Resistivity Doppler Index was around 0.5
- Coagulopathy was monitored by the use of rotational thromboelastometry (ROTEM) and corrected with infusions of multiple units of platelets and plasma
- The patient required abdominal surgical revision several hours postoperatively without evidence of a clear source of bleeding
- He exhibited severe metabolic acidosis (pH 7.19, base excess -12 mmol/l, lactate 20.3 mmol/l), hypotension for several hours and acute anuric renal failure (creatinine 2.9 mg/dL, urea 51 mg/dL)
- Additionally, at this time he showed signs of severe liver dysfunction as evidenced by clearly elevated alanine aminotransferase (ALT, 2486 U/l), aspartate aminotransferase (AST, 8852 U/l), and bilirubin serum levels (5.5 mg/dl)
- With the rationale to stabilize the deteriorating clinical condition in the context of the underlying ischemia-reperfusion injury accompanied by hemodynamic instability, hyperlactatemia and severe liver failure, the decision was made to initiate combined continuous veno-venous hemodiafiltration (CVVHDF) and CytoSorb therapy on POD 1 (1st treatment interval)
- Due to reoccurrence of progressive hyperbilirubinemia after resolution of the initial shock, a second treatment interval with CytoSorb was started

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Treatment

- During the first treatment interval, a total of 4 CytoSorb therapy days were performed, with a change of cartridge every 12 hours. The second treatment interval included 3 CytoSorb therapy sessions with 24 hours of run time per adsorber
- CytoSorb was used in conjunction with continuous renal replacement therapy (Fresenius Multifiltrate) run in CVVHDF mode
- Anticoagulation: regional citrate anticoagulation
- Blood flow rate: 200 ml/min
- CytoSorb adsorber position: pre-hemofilter

Measurements

- Hemodynamics and need for vasopressors
- Lactate
- Bilirubin

Results

- Treatment was associated with a slow but steady improvement in hemodynamics accompanied by a reduction in vasopressor doses
- Combined CVVHDF and CytoSorb therapy also resulted in resolution of the lactic acidosis
- Treatment also led to an efficient and sustained reduction in plasma bilirubin levels

Patient Follow-Up

- On POD 6, the patient started to develop an isolated progressive hyperbilirubinemia, reaching plasma levels around 18 mg/dl with renal failure still present
- Consequently, on POD 8 CVVHDF was re-started together with CytoSorb hemoadsorption therapy, resulting in a decrease of bilirubin to around 11 mg/dl within two days and further decreasing levels thereafter
- However, liver biopsy was performed, with evidence of an ischemic-hemorrhagic area taking up 80% of the sample, associated with cholangitis as well as CD4 positivity
- The patient eventually underwent a second liver transplant on POD 17

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Conclusion

- In this patient with ischemia-reperfusion injury, hemorrhagic shock and hyperbilirubinemia following liver transplant, the combined usage of CVVHDF and CytoSorb hemoadsorption therapy resulted in an improvement in hemodynamics, resolution of lactic acidosis, and an efficient and sustained reduction in plasma bilirubin
- Given the usual limitations of a case report, CytoSorb may be a useful tool also for complications after liver transplantation, particularly to treat a potential initial "stunning" of the graft (prolonged organ dysfunction after hypoxia), such as in ischemia-reperfusion injury
- Moreover, CytoSorb constitutes a safe and easy treatment of hyperbilirubinemia and may also represent a bridging therapy before (re-)transplantation