Case of the week 17/2017

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Use of CytoSorb in combined haemorrhagic and septic shock

Dr. Tobias Hübner, Dr. Stefanie Wick, Dr. Thomas A. Neff
Anesthesiology, Münsterlingen Canton Hospital, Switzerland

This case study reports on a 78-year-old male patient who was admitted to the hospital by the emergency service, after he underwent an elective colonoscopy with polyp removal with radiography for suspicion of neoplasia of the middle rectum one week before and collapsed a few days later with lower gastrointestinal bleeding whilst on the way to the toilet.

Case presentation

- On admission, the patient already presented with hemorrhagic shock, marked hypotension and a systolic blood pressure of 80 mmHg
- Ultrasound examination confirmed a probably blood-filled right hemicolon. His hemoglobin level at this time was 80 g / l
- Immediate transfer of the patient to the intensive care unit for hemodynamic stabilization and further monitoring
- Initiation of an empirical antibiotic therapy with piperacillin/tazobactam (4.5 g/8 hours) upon admission to intensive care due to potential hollow organ perforation after polyp removal, which could not be reliably excluded
- Subsequent gastroscopy and rectoscopy confirmed the diagnosis of lower gastrointestinal hemorrhage due to numerous clots in the patient's colon as well as the suspected diagnosis of neoplasia in the rectum
- Overnight, another hemodynamically relevant hemorrhage occurred and an angio-CT was performed for localization of the bleeding. The patient could be kept stable with low-dose catecholamines at any time
- The following morning, progressive deterioration of his general condition with additional fever. In the CT scan the patient was found to have a massively dilated colon with blood-mixed stool so the diagnosis of a toxic megacolon was made
- At this time, the patient already exhibited a marked increase in norepinephrine (28 µg/min) and epinephrine needs (5 µg/min), leukocytosis (25,200/µl), thrombocytopenia (53,000/µl) as well as significantly increased inflammation-relevant parameters (CRP 305 mg/l, PCT 12 ng/ml)
- Immediate decision for a surgical intervention, followed by intubation and start of advanced hemodynamic monitoring using PiCCO
- Preoperatively and preemptively, continuous renal replacement therapy was initiated with CytoSorb in combination, in order to avoid the foreseeable flooding syndrome as soon as the colon would be mobilized. This therapy was continued intraoperatively.
- After laparotomy, an overblown, ischemic right hemicolon was detected and an extended right hemicolectomy with installation of a terminal ileostomy was performed, causing further worsening of the hemodynamic situation (norepinephrine 37 µg/min, 5 µg/min epinephrine)
- Postoperative retransfer to the intensive care unit, intubated, ventilated and anuric (acute renal insufficiency AKIN III), with ongoing CVVHD and CytoSorb, and initiation of additional adjunctive therapy with hydrocortisone (200 mg/24 hours), highly dosed vitamin therapy (B complex, vitamin C), albumin (3 × 100 ml of human albumin)

Treatment

- Two treatments with CytoSorb for a total duration of 44 hours (1st treatment for 20 hours, 2nd treatment for 24 hours)
- Cytosorb was applied in conjunction with CRRT (Multifiltrate, Fresenius Medical Care) run in CVVHD mode
- Blood flow: 150 ml/min
- Anticoagulation: citrate
- CytoSorb adsorber position: pre-hemofilter

Measurements

- Demand of catecholamines
- Parameters of inflammation (leucocytes, thrombocytes, CRP, PCT)
- Lactate
- Renal function (diuresis)

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Results

- Within the first four postoperative hours, a further worsening (presumably due to massive flooding with PAMPs and DAMPs) with peripheral vasoplegia (norepinephrine 70 µg/min) was observed. From the fifth postoperative hour however, the medical team noticed an unexpectedly clear improvement and from then on continuous progression towards hemodynamic stabilization until the norepinephrine could be reduced to 9 µg/min within 24 hours, and the adrenaline could already be tapered out
- After the 2 treatments, CRP was halved, leukocytes fell to 11,200/µl and normalized shortly thereafter, with successive recovery of platelets to normal values after one week, PCT had already halved after the first treatment
- Lactate was 5.1 mmol/l after 24 hours and 2.3 mmol/l at 48 hours, 3 hours later the lactate was within the normal range (53 hours postoperatively)
- Spontaneous diuresis within 24 hours, after 48 hours normal diuresis
- Successful change from inhalative sedation to propofol, norepinephrine could be maintained at the same low level
- Dose adjustment of the antibiotic therapy was not necessary during therapy

Patient Follow-Up

- Patient was free from catecholamines after 4 days
- After 7 days successful extubation and cessation of CRRT
- Discharge to the normal ward after 11 days and initiation of neoadjuvant chemotherapy

CONCLUSIONS

- **Clear reduction in inflammatory parameters under CytoSorb therapy within 48 hours as well as a rapid stabilization and consolidation of hemodynamics with shock reversal after a total of 2 treatment cycles to ~ 10% of the maximum norepinephrine dose**
- **The early and perioperative application of CytoSorb along with all the other therapies probably improved morbidity and mortality in this patient**
- **In the future and according to the medical team, the adsorber should be used more frequently and with a lower threshold, in order to avoid acute deterioration in the patients condition, also perioperatively**
- **The application of CytoSorb therapy was simple, safe and the installation of the adsorbers was possible without problems**