

## COVID-19 presenting as acute abdomen and sepsis: a rare case-report

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*This case reports on a previously healthy 45-year-old male of Asian origin, who was admitted to the Emergency Department due to a recent (six days) onset of fever (39°C), cough, dyspnea, diarrhea, vomiting, and abdominal pain.*

### Case presentation:

- Physical examination revealed bilateral crackles on the lung bases, and severe pain located in the epigastrium
- Peripheral oxygen saturation (SpO<sub>2</sub>) was 82% on room air, his heart rate was 109/min and blood pressure 89/47 mmHg
- The patient was promptly intubated, mechanically ventilated and resuscitated with the administration of low-dose norepinephrine and crystalloid fluids
- Positive SARS-CoV-2 infection was confirmed by means of Real-Time-Polymerase-Chain-Reaction (RT-PCR) assay performed on nasopharyngeal swabs
- Electrocardiogram, cardiac enzymes, and echocardiography were normal
- Baseline laboratory findings showed leukocytosis (20x10<sup>3</sup>/μl) with lymphocytopenia (0.47x10<sup>3</sup>/μl) as well as increased levels of C-reactive protein (99 mg/l), lactate dehydrogenase (997 U/l), lactate (6 mmol/L), and D-dimers (4.1 μg/ml)
- Upon admission, urea plasma concentration was 6.1 mmol/l and his creatinine was 119 μmol/l. The rest of his blood count, coagulation profile, and biochemistry report were within normal range
- Chest computed tomography (CT) scans revealed bilateral peripheral ground-glass opacities with associated infiltrates and pulmonary embolism (PE)
- Emergency abdominal CT scans showed a thickened bowel wall and portal vein thrombosis, however with no clear picture of an intestinal perforation
- Duplex ultrasonography of the lower limbs excluded deep vein thrombosis
- However, the patient's clinical status did not improve and thus he underwent emergency exploratory laparotomy
- Intraoperatively, a contained small intestinal perforation with associated peritonitis was found; hence resection of an ischemic area of the jejunum was performed without complications
- Histopathological examination of a resected small intestinal specimen revealed epithelial necrosis with hemorrhagic infarction changes and neutrophilic inflammation with fibrin deposition within the lamina propria
- Postoperatively, the patient was admitted to the level III COVID-19 designated intensive care unit (ICU)

- On ICU admission, empiric therapy was administered with ribavirin (400 mg tablet every 12 hours), meropenem (adjusted to renal function, 0.5 g intravenously every 12 hours) and vancomycin (15 mg/kg intravenously loading dose). Furthermore, he received therapeutic anticoagulation with enoxaparin 75 mg subcutaneously once daily, ARDS-net ventilation (positive end-expiratory pressure of 9 cmH<sub>2</sub>O), administration of hydrocortisone and vasopressors, as well as supportive ICU care
- The patient developed acute kidney injury (AKI) as evidenced by increased urea (7.9 mmol/l) and creatinine levels (309 μmol/l)
- It was speculated that the development of AKI was partially due to severe COVID-19 and the perioperative septic shock
- The patient developed a mild metabolic acidosis and hyperkalemia while remaining anuric and in this shock state necessitating the administration of vasopressors for hemodynamic stabilization (day 1 post-ICU admission)
- Prompt continuous renal replacement therapy (CRRT) was started and two sessions of CRRT were administered for two consecutive days (24 hours/day)
- In addition, extracorporeal blood purification therapy by means of CytoSorb hemoadsorption was performed due to persistent sepsis and to mitigate the ensuing multiple organ failure

### Treatment

- Treatment with two CytoSorb adsorbers changed after 24 h of use
- CytoSorb was used in conjunction with CRRT (Prismaflex, Baxter)
- Ultrafiltration rate: 250–400 mL/min
- CytoSorb adsorber position: post-hemofilter

### Measurements

- Hemodynamics and catecholamine requirements
- Inflammatory parameters
- Renal function
- Lactate
- Lung function/oxygenation
- Coagulation and bleeding

### Results

- Following two sessions of combined CRRT with CytoSorb therapy, vasopressors could be weaned off on day 3
- Inflammatory biomarkers were back to within a normal range 3 days after ICU admission
- Recovery of renal function with initiation of diuresis on day 3
- Treatment was further associated with a normalization in lactate levels
- His oxygenation progressively improved as shown by an increase in the PaO<sub>2</sub>/FiO<sub>2</sub> ratio >300 mmHg on day 6
- No bleeding episodes were observed although the patient received full anticoagulation therapy due to venous thromboembolism

### Patient Follow-Up

- Fortunately, the patient did not have a severe coagulopathy, and a transfusion was deemed necessary only once with two packs of red blood cells, while he was on CRRT (day 1)
- CRRT was discontinued three days post-ICU admission
- The patient was extubated on day 7 after admission to the ICU
- His renal function normalized approximately two weeks post-ICU admission
- Broad-spectrum antibiotics were administered for a total of two weeks and therapeutic anticoagulation with low-molecular-weight heparin was continued for one month
- His RT-PCR for COVID-19 was negative on day 19
- The work-up for autoimmune disorders included lupus anticoagulant, antiphospholipid antibodies (anticardiolipin, anti- $\beta$ 2- glycoprotein I antibodies), antineutrophil cytoplasmic antibodies, and thrombophilia screening (i.e., levels of proteins C and S, homocysteine, factor V Leiden), and did not reveal any abnormalities
- All follow-up bloods, urine, and sputum cultures were negative approximately 24 days after ICU admission
- The patient was discharged in a good clinical condition 34 days post-ICU admission

### Conclusions

- In this patient with COVID-19 presenting as acute abdomen and sepsis, treatment with CRRT and CytoSorb cytokine adsorption therapy resulted in hemodynamic stabilization with a significant decrease in vasopressor needs and levels of inflammatory parameters as well as a normalization in lactic acidosis and an improvement in lung and renal function
- The authors conclude that extracorporeal blood purification may be useful in managing perioperative sepsis, AKI and cytokine storm which are all poor prognostic factors in critically ill patients with COVID-19
- Presumably, the early application of hemoadsorption mitigated a full blown picture of COVID-19 related hyperinflammation and/or the development of refractory septic shock