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Case of the week 18/2018

Use of CytoSorb in peri-operative ECMO therapy in a patient with complex infected pleural effusion after lung volume reduction surgery

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This case study reports on a 58-year-old female patient (known pre-existing conditions: very severe COPD (Gold stage IV), encapsulated pleural effusion with suspicion of empyema after left lung volume reduction 12/2017, pulmonary hypertension 59 mmHg + CVP, and arterial hypertension), who was transferred in a complex respiratory weaning state from a respiratory clinic to Hospital Ibbenbüren requiring surgical debridement of a pleural effusion/empyema.

Case presentation

- Admission of the tracheotomized patient under BiPAP ventilation (Pinsp 27 mmHg, PEEP 8 mmHg) with normal oxygenation to the intensive care unit although the patient had chronic hypercapnia (pCO_2 55-60 mmHg)
- Preoperatively, the condition of the patient was relatively stable considering the known limitations from her chronic lung disease, showing normal infectious parameters and no need for catecholamines at any time
- Antibiotic therapy with tazobactam/piperacillin had already been initiated by the respiratory clinic, as a result of which there was no microbiological data
- In order to support intraoperative gas exchange and, in particular, CO_2 elimination because of the pre-existing hypercapnia due to her severe COPD and the upcoming one lung ventilation during the operation, the patient was preemptively connected to vv-ECMO, enabling protective ventilation with excellent CO_2 elimination and oxygenation
- The surgical procedure included decortication due to marked callosity, pleurectomy, pleurolysis and intrapleural relief of an encapsulated pleural effusion
- With the rationale and pathophysiological consideration of preventing a septic episode caused by the surgical manipulation of a chronic infection followed by release of infectious material, a CytoSorb adsorber was preventively integrated directly into the vv-ECMO circuit

Treatment

- One treatment with CytoSorb for a total treatment time of 24 hours
- CytoSorb was used in combination with an ECMO console (Novalung, Xenios AG, Heilbronn, Germany) and in conjunction with a X-Lung oxygenator
- Blood flow: 1.3-1.5 l/min via a 22F Twinport cannula inserted into the right internal jugular vein
- Sweep Gas Flow: up to 0.8 liters
- Anticoagulation: due to heparin coating of the systems, initially no anticoagulation was used intraoperatively, postoperatively argatroban anticoagulation was applied until explantation of vv-ECMO (0.2 µg/kg/min) (target PTT of 50 sec)
- CytoSorb adsorber position: established in the backward bypass – blood drawn at the oxygenator and returned before centrifugal pump at P1 (see figures 1 and 2)

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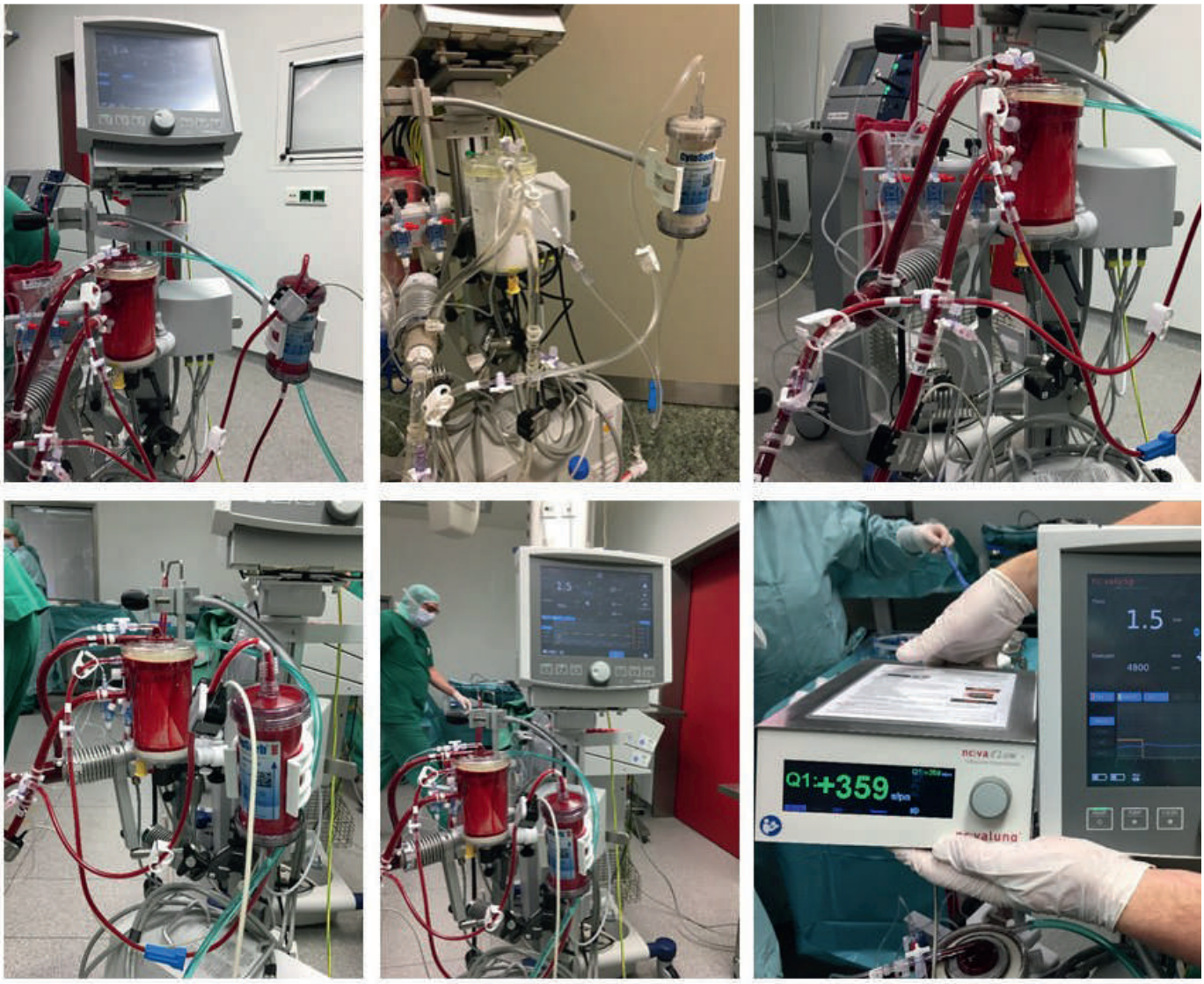

Figure 1

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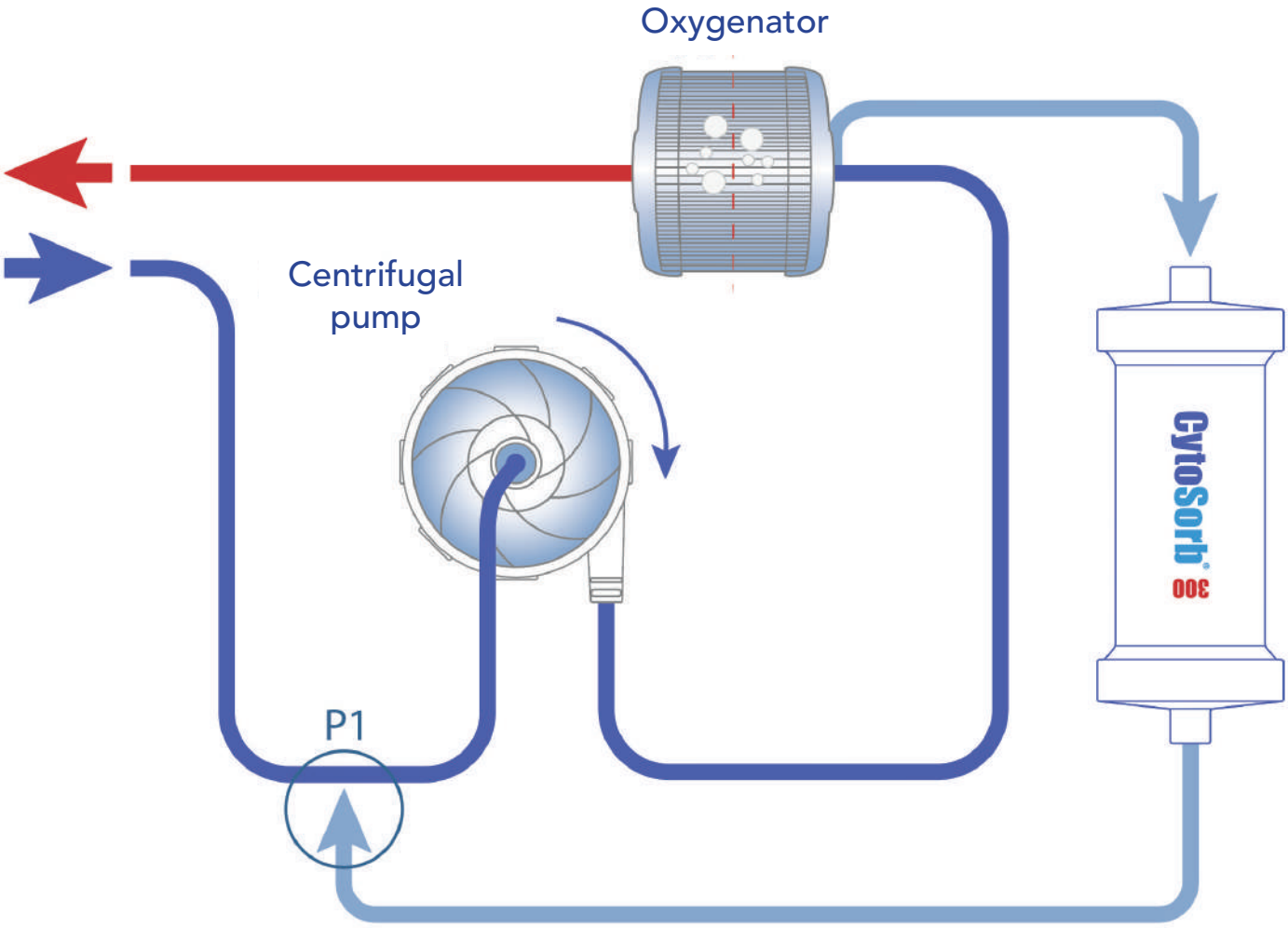

figure 2

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Measurememts

- Hemodynamics and need for catecholamines
- Inflammatory parameters
- Blood gas analysis
- Invasiveness of ventilation

Results

- Stable hemodynamic conditions without the need for catecholamine therapy before, during and after surgery
- The patient had normal inflammatory and infectious parameters throughout the perioperative course
- Lactate plasma concentrations and other metabolic parameters were in the normal range also in the postoperative period
- Immediately after the operation, phases of spontaneous breathing and a significantly lower level of ventilation invasiveness (Pinsp of 20 mmHg, PEEP 5 mmHg) could be established

Patienten Follow-Up

- Removal of vv-ECMO 44 hours after initiation with improved pCO_2 values between 50-55 mmHg
- Discharge and transfer back to the respiratory clinic for further respiratory weaning in a significantly improved condition

Conclusions

- CytoSorb in combination with the vv-ECMO was safe, technically feasible and easy to use
- Surgery with the supportive treatment resulted in a reduction in ventilation pressures with the possibility of establishing phases of spontaneous breathing with moderately improved hypercapnia
- The overall course of treatment in this patient with a rather complex pulmonary medical history who was difficult to wean from mechanical ventilation having experienced most severe recurrent infections was better than in comparable patients, which might be explained by the surgery per se, but could also be due to control of the septic inundation process by CytoSorb