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Case of the week 38/2022

CytoSorb hemoadsorption for removal of apixaban – a proof-of-concept pilot case for a randomized controlled trial

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This case reports on an 81-year-old man who presented to the hospital with methicillin-sensitive Staphylococcus aureus prosthetic aortic valve endocarditis and hemodynamic instability requiring an urgent operation (EuroSCORE II 31.05%).

Case presentation

- Six years earlier, he underwent combined coronary artery revascularization and aortic valve replacement with a bioprosthetic valve
- The patient was on non-vitamin K antagonist oral anticoagulant (NOAC) therapy with apixaban due to chronic atrial fibrillation which was discontinued 24 hours prior to the start of surgery
- Giving the urgency of the operation, complete physiological washout of the drug could not be achieved, and the decision was made to add a CytoSorb adsorber into the cardiopulmonary bypass (CPB) circuit to remove apixaban from the blood
- During the operation, the infected aortic prosthesis was removed and replaced with a new biological bio-prosthesis. The surgery was complicated by a massive bleed from a laceration of the right pulmonary artery after removal of the aortic clamp requiring multiple blood product transfusions (8 units of red blood cell concentrate, 2 units of platelets, 4 units of fresh frozen plasma and 3 grams of human fibrinogen) and a second cross-clamping to enable repair. Total aortic cross clamp time was 144 minutes, with a CPB time of 288 minutes and a total surgery time of 420 minutes

Treatment

- One CytoSorb treatment session was run during the entire CPB time
- The CytoSorb adsorber was mounted in parallel into the CPB circuit between the oxygenator and the venous reservoir
- Anticoagulation: heparin was administered at a standard dose of 400 U/kg reaching an ACT> 400s

Measurements

- Apixaban plasma level
- Coagulation parameters

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Results

- Direct measurement of pre-adsorber inlet and post-adsorber outlet apixaban plasma levels showed a rapid and sustained decrease of the drug through the adsorber
- Thromboelastometry at the end of the procedure showed completely normalized coagulation values (clotting time: EXTEM=59s, INTEM=200s, FIBTEM=53s)

Patient Follow-up

- Postoperatively the patient was admitted to the Intensive Care Unit in spontaneous sinus rhythm on high-dose inotropic and vasopressor support
- Chest drains volume was contained (650 ml /24 hours, 300 ml/ 48 hours)
- The postoperative course, however, was marked by right ventricular failure with pulmonary hypertension and tricuspid insufficiency requiring nitric oxide (NO) therapy
- Extubation was achieved on the 9th postoperative day, but the onset of a bilateral pneumonia caused a recurrent deterioration of his hemodynamic status
- The patient and the family asked to stop further active therapy and the patient died on the 11th postoperative day

Conclusion

- To the best of the authors' knowledge, this is the first clinical case that directly proves the efficacy of CytoSorb hemoadsorption therapy for apixaban removal in a patient undergoing emergency open-heart surgery, with direct measurements of the plasma levels of the drug pre and post adsorber
- Despite the unfavorable clinical outcome related to the patient's comorbidities and a technical complication that incurred during the surgery, treatment was associated with good control of the peri- and post-operative bleeding risk and hemodynamic stabilization
- Therefore, CytoSorb could represent a feasible treatment option on a routine basis for patients on NOAC therapy with apixaban who require emergent surgical procedures

Note from CytoSorbents: Use of CytoSorb therapy for removal of apixaban is not covered by the current IFU.