

Use of CytoSorb therapy in combination with extracorporeal circulation during prosthetic valve endocarditis

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This case reports on a 20-year-old patient with a history of multiple cardiac surgeries in her childhood, who presented to the hospital with complaints of asthenia (weakness) and fever for 7 days.

Case Presentation

- Known complex medical history included Noonan syndrome diagnosed in her childhood for which she underwent enlargement of the ascending aorta and application of a lung ring at the age of 1, cardiac re-operation and mechanical aortic valve replacement and biological pulmonary valve replacement at the age of 13, balloon angioplasty at the age of 14, and, at the age of 17 she underwent a percutaneous pulmonary valve implantation due to structural deterioration of the previous prosthesis, existing atrial septal defect
- Because of her extensive cardiovascular history, blood cultures were taken with subsequent isolation of Gram-negative bacilli, followed by initiation of antibiotic therapy with ceftriaxone and amikacine. Uroculture and COVID-19 PCR tests proved negative
- Laboratory parameters on admission were as follows: hemoglobin 8.8 g/dl, white blood cells 12,300/ μ l, platelets 127,000/ μ l, LDH 247 U/l and CRP 99 mg/dl, liver markers were within the normal range
- Echocardiogram showed no evidence of vegetations, however a thickening of the pulmonary valve was noticed with acceleration and narrowing of the transvalvular flow. Subsequent PET-CT confirmed these findings
- Antibiotic therapy was changed to ceftriaxone and gentamicin following isolation of gram-negative bacteria from the HACEK group (gram-negative coccobacillary organisms).
- The patient was therefore planned for the surgical procedure (pulmonary valve replacement with a homograft and closure of the atrial septal defect)
- Pre-operatively, her hemodynamic situation was unstable, necessitating significant doses of norepinephrine (0.3 μ g/kg/min)
- Given the young age of the patient, her extensive medical history, the infectious profile as well as the complexity of the procedure, a CytoSorb hemoadsorber was integrated into the cardiopulmonary bypass circuit with the rationale to reduce the hyperinflammatory response, which was anticipated to be triggered by this major procedure in a patient with considerable cardiac history
- Subsequently, the operative procedure was performed including 120 min of total cardiopulmonary bypass time and 95 minutes of aortic cross clamping

Treatment

- CytoSorb was used in conjunction with the cardiopulmonary bypass machine (Remowell, Euroset, CPB circuit) for a period of 120 minutes
- Anticoagulation: heparin
- Blood flow rate: 500 ml/min
- ACT: 600 sec

Measurements

- Hemodynamics and catecholamine requirements
- Laboratory values
- General postoperative status and development

Results

- Perioperatively, her norepinephrine demand decreased significantly, from a pre-surgical dose of 0.3 µg/kg/min to 0.07 µg/kg/min in the immediate postoperative period
- Post-surgical laboratory values were unremarkable (lactate dehydrogenase - LDH 110 U/l, C-reactive protein - CRP 35 mg/dl and also renal and hepatic function remained stable)
- Extubation 4 hours after leaving the operating theatre, with clinical evidence of good peripheral perfusion

Patient Follow-up

- No bleeding complications occurred and surgical drains were removed after 48 hours
- She was discharged from the hospital after 7 days, with prolonged intravenous antibiotic treatment prescribed
- After 6 months of follow-up, the patient is well and healthy, without any recurrent infectious episodes

Conclusion

- The intraoperative use of CytoSorb incorporated into the CPB circuit in this patient with endocarditis and extensive cardiovascular history undergoing her third cardiac re-operation and replacement of an infected prosthetic pulmonary valve was associated with an improvement of the perioperative hemodynamic situation accompanied by good peripheral perfusion, a control of the hyperinflammatory response as well as an unexpectedly rapid postoperative clinical recovery
- Furthermore, the surgical and recovery team observed a rapid improvement of postoperative vasoplegia, which is normally not seen like this in other patients exposed to similar procedures
- According to the medical team, the application of the CytoSorb adsorber might potentially reduce the overall costs for such patients in Argentina by accelerating recovery and reducing length of stay
- No adverse events were recorded and CytoSorb was easy to use in combination with the CPB