

Rapid treatment of unexpected septic shock: a single pediatric case recovery for Septic Shock due to Streptococcal Arthritis using early extracorporeal cytokine adsorber treatment

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BACKGROUND AND AIMS

We present a case of a male patient, aged 11 months, hospitalized in our Pediatric Hospital Giovanni XXIII (Bari, Italy) and evaluated by orthopedist at admission for a huge right knee edema, caused by β -Hemolytic Streptococcus and Staphylococcus Aureus and developed in septic shock within 12 hours after the admission. The patient was transferred to Pediatric ICU, in pre-agonal conditions, not responding to septic shock conventional treatments. After parental consent, we added the extracorporeal cytokine adsorber treatment (Cytosorb) to therapy, as life saving treatment. After two sets of 18 hours, we obtained a massive reduction of inflammatory mediators (IL-6, IL-10 and TNF α), an improvement of PRISM III and SOFA Score, a decrease of catecholaminic support and an improvement of respiratory and metabolic parameters. After 5 days, the patient was transferred to the pediatric ward.

MATERIALS AND METHODS



Twelve hours after the admission in orthopedic ward the patient presented hypotension (MAP < 40 mmHg), tachycardia (175 bpm), dyspnea and tachypnea, fever (38,8°C), anuria, cyanosis of the extremities, diffused petechiae and low neurological response to stimulation (GCS 7). Blood gas analysis showed pH 7.19, PaCO₂ 55 mmHg, PaO₂ 75 mmHg, lactate 5.5 mmol/L, Be -12 mmol/l. On arrival in ICU two peripheral intravenous catheters, one central catheter and a radial arterial catheter were inserted. After sedation and curarization the patient was intubated and connected to mechanical ventilator in PC – Mode. Laboratory exams defined values of: 480 mg/dl Proteine C Reactive; Lactate > 4 mmol/L, thrombocytopenia (50.000 plt), hyperfibrinogenemia. Presence of pulmonary thickening at the chest radiograph. The patient clinical condition was not responding to high inotropic, vasopressor and diuretic support, to crystalloids, blood, plasma, albumin infusion; temperature was 39°C and broad spectrum antibiotic therapy not even related to blood cultures started. Mechanical cooling and maximal ventilatory support had no result. A continuous renal replacement therapy (CRRT) using a nephrological device (Prismaflex System, Germany) was started and, after parental consent, an emoadsorbent cartridge (Cytosorb) was integrated in a post-hemofilter position in the traditional CRRT circuit. Continuous veno-venous hemodiafiltration (CVVHDF) flow ranged from 20-30 ml/kg/h, ultrafiltration rate was variable with hemodynamics; heparin anticoagulation (5-30 IU/Kg/h) was controlled with activated clotting time (ACT: 150-200 sec), APTT-INR (1.5-1.8), Thromboelastogram (TEG), every 4 hours. The first treatment had a duration of 18 hours separated from the second one by a 24 hours pause interval, to verify improvements in PRISM III and SOFA score; Clinical and biochemical parameters were measured daily. To analyze reduction of inflammatory mediators (IL-6, IL-10 and TNF α) blood samples were taken, centrifugated and cooled to -80°C every 8 hrs. CVVHDF was continued for 3 days. After 4 days of respiratory weaning, and with no cardiac drug support, the patient was extubated and in 5 days was transferred to the pediatric ward.

RESULTS

The dosage of 0.05 μ g/kg/min of Norepinephrine changed to 0.03 μ g/kg/min after the second treatment and stopped after 24 hours. Reduction of inflammatory mediators: IL-6 from 140 to 0,5 pg/ml, TNF α 351 to 38 pg/ml and after 0,5 to 0 pg/ml and IL10 from 0,5 to 14 pg/ml. SOFA Score (from 18 to 9) and PRISM III Score (from 27 to 10) declined very quickly with daily reduction of inflammatory mediators and a rapid improvement of metabolic, respiratory and hemodynamic status.

CONCLUSION

The immediate use of CytoSorb allowed us to obtain a rapid improvement of the hemodynamic conditions, of renal and pulmonary functions, reduction of vasopressors and resolutive reduction of “cytokines storm”, a not rare deadly event even in pediatric patients.

Patient Data at Admission		Patient Data before, during and after treatment			
Hypotension	MAP < 40 mmHg				
Tachycardia	175 bpm	Data	Before 1st Treatment	After 1st Treatment	After 24 hours
Fever	38,8 °C	Norepinephrine	0.05 μ g/kg/min	0.03 μ g/kg/min	0
GCS	7	IL-6	140 pg/ml	0.5 pg/ml	0.5 pg/ml
pH	7.19	TNFα	351 pg/ml	38 pg/ml	0.5 pg/ml
PaCO₂	55 mmHg	SOFA Score	27	10	
PaO₂	75 mmHg	PRISM III Score	18	9	
Lactate	5.5 mmol/L				
BE	-12 mmol/L				
PRC	480 mg/dL				
PLT	50000				

Tab. 1 – Patient’s data before, during and after the treatments.

REFERENCES

- Milella L, Ficarella M: First Application of CVVHDF, Plasmapheresis and Cytosorb adsorber to Solve a Pediatric Haemophagocitic Histiocytosis Case. Res Pediatr Neonatol 2017;1: RPN.000510.
- Milella L ; Journal of Pediatrics and Neonatal Care: Neonatal and Pediatric General and Cardiac Anaesthesia and ICU: What’s new in 2017/2018 ? Bari Pediatric Hospital Experience - Italy - Volume 8 Issue 2 – 2018
- Milella L; “Use of CytoSorb in a pediatric case of acute hemorrhagic encephalitis and multiple organ failure” Cytosorb Library-May 2018-case of the week 14/2018
- Rodhes et all; Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. Intensive Care Med. 2017 Mar;43(3):304-377. doi: 10.1007/s00134-017-4683-6.