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A Case of Successful Application of HA 330 System for Treatment of Sepsis in a 6-month Old Hematological Patient

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Abstract

This paper describes the clinical case of child, aged 6 months, body weight 6 kg, the patient was diagnosed with Partial Red Cell Aplasia. In addition, 2nd degree protein-energy insufficiency of pre- and post-natal origin was present, complicated by sepsis, acute course peak septicemia, complicated by toxic shock, hemorrhagic syndrome, DIC, intestinal paresis, and acute renal damage. Mesenteric vascular thrombosis was present. Also, necrosis of the large intestine, soft tissues of the anterior abdominal wall on the left, perineum, gluteal region on the left, in / 3 of the left thigh were diagnosed. The patient had and intestinal fistula installed.

Pediatric continuous veno-venous hemodiafiltration with a HA 330 disposable hemoperfusion cartridge (Jafron Biomedical Co., Ltd, China), has proven its practical importance in the fight against sepsis in a small patient at the age of 6 months with an oncohematological disease - highly effective and safe. Execution is not technically difficult, fast and affordable. The use of the HA 330 disposable hemoperfusion cartridge (Jafron Biomedical Co., Ltd, China) played a key role in the life of the child, namely: despite the long course of severe oncohematological disease from birth, the baby lives and develops according to his age.

Clinical Case.

In June 2019, a child N., aged 6 months, body weight 6 kg, with a diagnosis of Severe Iron deficiency anemia (III degree), was referred for treatment to the National Scientific Center for Maternal and Child Health CF UMC from the regional hospital of Kazakhstan.

From patient history it is known that the child was born from IV pregnancy with the history of severe iron deficiency anemia (hemoglobin - 60 g/l), IV childbirth (12/08/2018) at 43 weeks of gestation by cesarean section. Birth weight was 2480.0 g, height was 49 cm. The child suffered from anemia at birth. In blood tests, hemoglobin 106 g/l at birth, 68 g/l at two weeks and 104 g/l at three months of age. Blood type - A (II) Rh+. The child was attended by a hematologist at maternity hospital and received Fersinol NEO in an age-related dosage for two months, to no effect (hemoglobin - 25 g / l at two months of age).

The patient was transferred to a hospital unit promptly upon discharge from the maternity hospital and received treatment for hypochromic grade III iron deficiency anemia of mixed etiology. The diagnosis also included congenital heart defect and ventricular septal defect. The patient developed an acute respiratory viral infection prior to admission to our unit. Upon examination, blood tests and Echocardiograph performed(Table 1). A blood transfusion was

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carried out twice (leukofiltered erythrocyte suspension at the rate of 15 ml/kg), fercyle, folic acid, and creon. Discharged home after a week with improvement and recommendations. In the control blood test, hemoglobin is 86 g / l.

Table 1. Examination

Indicators	Results
Serum iron	6.2 μmol / l
Ferritin	61.87 ng / ml
HIV blood	Negative
Hepatitis B and C markers	Negative
Echocardiography	Muscular dysfunction

Over the next four months, the child was admitted twice to the hospital with signs of grade III iron deficiency anemia, and he received blood transfusions (leukofiltered erythrocyte suspension at the rate of 15 ml/kg). Upon complex treatment, the patient's condition remained severe, unstable. Despite the blood transfusion, anemia persisted, with hemoglobin at 67 g/l; in dynamics - a spotted rash appeared, hyperemic, and spilled.

Given the severity of the condition, the lack of effect of the therapy in the region at the place of residence, the child was referred for treatment to the National Scientific Center for Maternal and Child HealthCF UMC.

Upon admission to our hospital, the patient's condition was grave due to endogenous intoxication syndrome complicated by sepsis and multiple organ failure. Assessment of the depth of a coma on the Glasgow scale was at 13 points. The patient had irregular breathing movements and was oxygen-dependent. The skin was pale, with a waxy hue, dry, there were dense spots of purple-violet color in the region of the anterior abdominal wall, inguinal region, in the buttock, the back displayed areas of necrosis in the left buttock (Fig. 1). Anasarca was present. The patient was hemodynamically instable, with intestinal paresis, and hepatosplenomegaly. There was stool delay for 10 days with the background of soft tissue necrosis of the perianal region. Finally, anuria was diagnosed.

The child was transferred to the Department of Pediatric Anesthesiology and Intensive Care, Pediatric Intensive Care Unit (hereinafter - ODARIT). During the follow-up examination and dynamic monitoring, the patient was diagnosed with Partial Red Cell Aplasia. In addition, 2nd degree protein-energy insufficiency of pre- and post-natal origin was present, complicated by sepsis, acute course peak septicemia, complicated by toxic shock, hemorrhagic syndrome, DIC, intestinal paresis, and acute renal damage. Mesenteric vascular thrombosis was present. Also, necrosis of the large intestine, soft tissues of the anterior abdominal wall on the left, perineum, gluteal region on the left, in / 3 of the left thigh were diagnosed. The patient had and intestinal fistula installed.

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Upon urgent indications, the patient was admitted for surgery, wherein the abdominal cavity was revised. Given hyperemia, swelling of the anterior abdominal wall, symptoms of low intestinal obstruction, we performed diagnostic laparotomy, suspended terminal ileostomy, and necrectomy of soft tissue of the perineum, left buttock region.

Despite intensive treatment, including the use of a combination of powerful antibacterial drugs (Meropenem, Imipenem, Revotaz, Metronidazole, Levofloxacin, Ciprofloxacin, Vancomycin, Fluconazole), the effect of conservative treatment was not observed. Given the aggravation of organ failure, toxic changes in blood tests written in Table 2., it was decided to conduct 2 three-hour sessions of pediatric continuous venous-venous hemodiafiltration with a disposable hemoperfusion cartridgeHA 330 **(**Jafron Biomedical Co., Ltd, China).

Table 2. Toxic changes in blood tests

Blood tests	Results
Leukocytes	30.00*10*^{9}\l
CRP	517.09 mg/l
ALT	40.04 U/l
AST	24.79 U/l
Urea	36.14 μmol\l
Creatinine	92.59 μmol/l
Procalcitonin	20.28ng/ml
Interleukin level 6	160 pg / ml
Protein S100	3.54 μg/l
CPK	68 U/l

The system was installed in the middle of the venous line contour after the Set ST 60 filter with the following parameters: blood flow of 50 ml/min, substitute solution of 250 ml/hour (predilution), dialysate 250.0 ml/hour, ultrafiltration 20 ml/hour, prolonged heparinization5-30 units\kg\hour. Throughout the procedure, the indicators remained stable: arterial pressure -120 mmHg, pressure Vienna 97 mmHg, TMD 40 mmHg.

Results: Against the background of continuous pediatric veno-venous hemodiafiltration with a HA 330 disposable hemoperfusion cartridge (Jafron Biomedical Co., Ltd, China), the IL-6, S100 inflammation markers decreased to normal within 36 hours. Leukocytosis after 1 session decreased to 5.3 * 10^{9}/l, procalcitonin was 7.28 ng / ml with normalization within 48 hours to 0.26 ng / ml; a significant decrease in C-reactive protein was noted - 324ng/ml, and after 2 sessions -5 ng/ml. At the same time, the level of transaminases, CPK was normalized, there was no need for catecholamines, the CRR was restored, the child was transferred to spontaneous respiration.

Effectiveness Criteria were: 1. Ventilation parameters, fan dependent.2. The need for catecholamines.3. Indicators of markers of inflammation, the level of ALT, AST, azotemia.

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Upon treatment, regression of areas of necrosis in the region of the anterior abdominal wall, inguinal region, in the region of the left buttock, back in the form of a decrease in the edges, falling off of the crusts were observed (Pic. 2,3). An ileostomy was removed on the anterior abdominal wall, with no signs of inflammation. The discharge of feces, yellow, was noted. Diuresis was adequate.

A child with an improved condition was discharged with recommendations from the center to the region at the place of residence.

There were no adverse side effects during and after combined extracorporeal support.

Picture 1. The area of necrosis before starting 2 sessions of combined extracorporeal support

Picture 2. The patient after 2 sessions of carrying out combined with a disposable hemoperfusion cartridge Extracor AT 330 (Jafron Biomedical Co., Ltd, China).

Picture 3. Baby at home 4 months after discharge.

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Conclusions: Pediatric continuous veno-venous hemodiafiltration with a HA 330 disposable hemoperfusion cartridge (Jafron Biomedical Co., Ltd, China), has proven its practical importance in the fight against sepsis in a small patient at the age of 6 months with an oncohematological disease - highly effective and safe. Execution is not technically difficult, fast and affordable.

The use of the HA 330 disposable hemoperfusion cartridge (Jafron Biomedical Co., Ltd, China) played a key role in the life of the child, namely: despite the long course of severe oncohematological disease from birth, the baby lives and develops according to his age.