Short Communication

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NEONATAL SEPSIS AND THE USE OF EXTRACORPOREAL THERAPY METHODS: A CLINICAL CASE

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ABSTRACT

Neonatal sepsis remains one of the leading causes of mortality in newborns. Limited data on the use of extracorporeal blood purification in this population highlight the need for further clinical observations. This article presents the first successful case in Kazakhstan of hemofiltration use in a neonate with sepsis caused by Klebsiella pneumonia ESBL 107 CFU/ml. We report the clinical course of a newborn with congenital malformations and early neonatal sepsis caused by *Klebsiella pneumonia* ESBL (10^7 CFU/ml). Continuous veno-venous hemofiltration (CVVH) using an ST60 pediatric hemofilter was performed in the intensive care unit. Monitoring included hemodynamic assessment, laboratory inflammatory markers, coagulation profile, urine output, and acid–base balance. CVVH led to stabilization of hemodynamics, reduction in lactate levels (from 4.5 to 1.6 mmol/L), normalization of diuresis, decrease in inflammatory markers (CRP from 297 to 19 mg/L; procalcitonin from 24.7 to 1.1 ng/mL), and platelet recovery (from 11 to 93×10^9/L). Vasopressor doses were reduced, enabling reconstructive surgery. The patient was successfully extubated and transferred to a specialized ward. This clinical case demonstrates the effectiveness and relative safety of hemofiltration in neonates with sepsis and MODS. The method may be considered a promising therapeutic option when standard treatment fails, underscoring the need for further multicenter studies.

Keywords: neonates; neonatal sepsis; extracorporeal blood purification; hemofiltration; multiple organ dysfunction syndrome.

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CLINICAL CASE

Neonatal sepsis remains one of the leading causes of mortality among newborns, with *Klebsiella pneumonia* being one of the most common etiological agents. The poor prognosis of neonatal sepsis is often associated with the development of systemic inflammatory response syndrome (SIRS) and multiple organ dysfunction syndrome (MODS). Standard sepsis therapy includes the early administration of antibacterial agents, anti-shock measures, infusion therapy, cardiotonic and vasopressor support, and respiratory therapy. However, the use of extracorporeal therapy methods in neonatal sepsis remains a subject of debate. Despite the proven efficacy of these methods in older patients, their application in neonatology remains limited and is primarily described in isolated clinical cases.

The aim of the study is to present a clinical case of a newborn with early neonatal sepsis and to analyze the characteristics and effectiveness of veno-venous hemofiltration using the ST60 set.

The newborn was delivered at 41 weeks of gestation, weighing 3200 g and measuring 55 cm in length, from the tenth pregnancy and eighth delivery. Multiple congenital anomalies were diagnosed in the early neonatal period, including:

• Cardiovascular System: Double aortic arch, patent ductus arteriosus (PDA), patent foramen ovale (PFO), and pulmonary artery sling (Congestive Heart Failure, Class III).

• Gastrointestinal Tract: Esophageal atresia with tracheoesophageal fistula.

On the third day of life, the newborn underwent a hybrid surgical intervention:

• Right thoracotomy with resection of the right aortic arch.

• Left transverse laparotomy with Kader gastrostomy placement.

On day 35 of life, the patient was discharged for outpatient follow-up in a satisfactory condition.

Two months later, the child was hospitalized at a local medical facility with a diagnosis of acute bronchitis. On the third day of hospitalization, the infant's condition deteriorated, presenting with worsening respiratory failure and signs of intoxication. Consequently, the patient was transferred to the intensive care unit (ICU). Despite initial antibiotic ther-

apy with gentamicin and cefuroxime, no significant clinical improvement was observed. Following a telemedicine consultation with specialists from the University Medical Center (UMC), the infant was urgently transported by medical aviation to the neonatal surgery intensive care unit at UMC in Astana.

Upon admission, the patient's condition was assessed as extremely severe, with multiple organ dysfunction syndrome (MODS). The sepsis progressed, accompanied by gastrointestinal transit disturbances, neurological symptoms, worsening respiratory failure (scoring 4 points on the Downes scale, indicating moderate respiratory distress), and lactic acidosis. In response, endotracheal intubation and invasive mechanical ventilation (IMV) were initiated.

Objective Examination

The patient is receiving treatment in an open resuscitation system (ORS) and is thermolabile. Pharmacological sedation is maintained with intravenous diazepam (Sibazon) 0.5% at a dose of 0.5 mg/kg/h, titrated as needed.

General Condition

The skin and visible mucous membranes are pale pink with a subicteric tint. A hemorrhagic rash is predominantly observed on the lower extremities. Signs of microcirculatory disturbances are present, with a capillary refill time of less than 4 seconds.

Respiratory System

The patient is on invasive mechanical ventilation (IMV) in normoventilation mode with the following parameters: FiO_2: 30%, Ti (Inspiratory Time): 0.57 sec, PIP/PEEP: 18/5 mbar, Respiratory Rate (Fset): 35 breaths per minute. Auscultation reveals equal breath sounds across all lung fields with occasional rales, predominantly in the upper respiratory tract.

Cardiovascular System

Heart sounds are rhythmic but muffled. Hemodynamic parameters are relatively stable with cardiotonic support using adrenaline at a dose of 0.05 µg/kg/min.

Gastrointestinal Tract

The abdomen is soft and accessible to palpation, with absent bowel sounds. Dark green gastric contents are observed through the nasogastric tube. The liver is palpable 2.0 cm below the costal margin, while the spleen is not palpable.

Urinary System

The patient presents with oliguria. Urine output is maintained through intravenous furosemide 1% at a dose of 0.2 mg/kg/h, with gradual titration based on clinical dynamics.

Status Localis:

• Cervical Region (Left Side): An esophagostomy is present, with clean edges and no signs of inflammation;

• Abdomen (Left of the Umbilical Ring): A 4.0 cm defect is observed at the gastrostomy site, with ulcerated, hyperemic, and edematous edges. Gastric content is eventrating through the defect, and the gastrostomy is non-functional;

• Central Venous Catheters: Right jugular vein: Certofix Trio Paed S 513; Right femoral vein: Certofix Duo Paed 420 (with reversed blood flow, no signs of inflammation at the puncture site).

Hemodynamic Parameters

Despite ongoing treatment, the patient remains hemodynamically unstable, with episodes of arterial hypotension. Consequently: the adrenaline dose was increased to 0.1 µg/kg/min; dopamine was added at a dose of 5 µg/kg/min intravenously, titrated as needed.

Prolonged veno-venous hemofiltration was performed using the Prismaflex® extracorporeal blood purification system (Baxter International Inc., Deerfield, IL, USA) with a pediatric hemofiltration set and an ST60 hemofilter designed for neonatal and pediatric patients.

Antibacterial and Antifungal Therapy Adjustments:

• Meropenem 10 mg/kg every 8 hours IV;

• Linezolid 10 mg/kg every 8 hours IV;

• Amikacin 7.5 mg/kg every 12 hours IV;

• Fluconazole 6 mg/kg/day IV for antifungal coverage.

Microbiological Findings

Bacteriological analysis of wound discharge identified: Ac*inetobacter baumannii* (10^7 CFU/ml) and *Klebsiella pneumonia* (ESBL 10^7 CFU/ml).

Blood cultures confirmed the presence of *Klebsiella pneumonia* (ESBL 10^7 CFU/ml), indicating a generalized infection. Additionally, a throat swab culture revealed *Candida tropicalis* (10^5 CFU/ml), necessitating monitoring for potential candidiasis.

Bacterial identification was performed using standard culture-based microbiological methods in the institutional clinical microbiology laboratory, in accordance with routine diagnostic protocols applied for neonatal specimens.

Antimicrobial susceptibility testing was performed for all isolated microorganisms using standard culture-based laboratory methods in the institutional clinical microbiology laboratory. Susceptibility profiles were determined in accordance with routinely applied diagnostic protocols for neonatal specimens.

The isolated *Klebsiella pneumoniae* strains were identified as extended-spectrum beta-lactamase (ESBL)-producing organisms and demonstrated multidrug resistance, particularly to beta-lactam antibiotics, including penicillins and cephalosporins. At the same time, preserved susceptibility to carbapenems and selected other antimicrobial agents was observed.

The results of antimicrobial susceptibility testing played a key role in guiding targeted antimicrobial therapy, enabling optimization of antibacterial treatment in the context of severe neonatal sepsis and multiple organ dysfunction syndrome.

Decision for Hemofiltration

Given the progressive deterioration despite ongoing therapy, the presence of infectious foci and sepsis (gastrostomy dysfunction, pneumonia, elevated inflammatory markers), hemodynamic instability, persistent metabolic acidosis unresponsive to intravenous sodium bicarbonate, worsening acute kidney injury, and multiple organ dysfunction syndrome (MODS), the decision was made to initiate prolonged veno-venous hemofiltration (PVVHF).

Renal Replacement Therapy

The procedure was performed in the neonatal surgery de-

partment using a PrismaFlex machine in pediatric prolonged veno-venous hemofiltration (PVVHF) mode with a pediatric column ST60 Set. The patient remained on invasive mechanical ventilation (IMV) and received high-dose vasopressor support.

At the start of the procedure, the infant's body weight was 3620 g. Following the standard preparation of the extracorporeal circuit as per the manufacturer's recommendations, PVVHF was initiated.

Procedure Parameters:

• Blood Flow Rate: 20 to 30 ml/min;

• Replacement Fluid Rate: 160 ml/h (predilution using NPNC as 50 ml/h, postdilution 110 ml/h);

• Machine Ultrafiltration Rate: 0 to 20 ml/h;

• Effluent Dose: 50 ml/h;

• Filtration Fraction: 13%;

Anticoagulation

Continuous heparinization was maintained at 2-6 IU/kg/h, with dose adjustments based on activated partial thromboplastin time (aPTT). The target aPTT range was maintained at 1.5–2 times the baseline value, following the current guidelines for hemofiltration.

Duration of Renal Replacement Therapy (RRT)

The therapy was conducted for 48 hours. Throughout the procedure, aPTT levels remained within the target range.

Clinical Outcomes:

As shown in Table 1, lactate levels decreased to normal values (from 4.5 mmol/L before the procedure to 1.6 mmol/L post-procedure). Doses of cardiotonic and vasopressor medications were reduced, reflecting improved hemodynamic stability. Dynamics of laboratory and clinical parameters before and after the initiation of hemofiltration in the neonate. Values are presented for two days before treatment (D–2, D–1), the day of initiation (D0), and post-treatment days 1 and 3 (D1, D3). Abbreviations: HF – Hemofiltration; CRP – C-reactive protein; ABG – Arterial blood gas analysis.

The heatmap demonstrates strong negative and positive correlations between leukocytes, platelets, C-reactive protein (CRP), and procalcitonin levels. A marked inverse correlation between leukocytes and CRP/procalcitonin indicates a reduction in inflammatory response following therapy.

Reference ranges for all laboratory and blood gas parameters have been added to Table 1. The reference values correspond to age-adjusted neonatal norms and are based on standard reference ranges routinely applied in the institutional laboratory.

The heatmap visualizes strong negative and positive correlations between variables:

1. Leukocytes and CRP (-0.91). A strong negative correlation indicates that as C-reactive protein (CRP) levels decrease, leukocyte counts tend to increase. This may suggest a reactive leukocytosis as the inflammatory burden subsides;

2. Leukocytes and Procalcitonin (-0.97). The very strong negative correlation suggests that a decrease in procalcitonin levels is accompanied by an increase in leukocyte counts. This could reflect a residual leukocytosis as a lingering immune response after clinical improvement and inflammation resolution;

3. Platelets and CRP (-0.79). A moderate negative correlation indicates that as inflammation resolves (reflected by lower CRP levels), platelet counts tend to rise. This may be attributed to bone marrow recovery following the resolution of the inflammatory process;

4. Platelets and Procalcitonin (-0.72). Similar to the pre-

Table 1 – Dynamics of laboratory and clinical parameters of the patient.

Indicator	D--2	D--1	D-0	D1	D3	Reference range
CRP (mg/L)	244	297	71	49	19	< 10
Procalcitonin (ng/ml)	24,7	24,7	1,7	1,1	1,1	0–24 h: < 2.0 >24–72 h: < 0.5
Leukocytes ($\times 10^9$/L)	4,3	5,7	8,7	8,8	8,7	9 – 20
Platelets ($\times 10^9$/L)	19	11	21	78	93	150 – 450
Lactate (mmol/L)	3,0	4,5	2,4	1,6	1,2	0.5 – 2.0
pH	7,3	7,4	7,5	7,3	7,3	7.35 –7.45
pCO2	52	35	34	35	40	35 – 45
pO2	47	234	95	34	38	50 – 80
BE	-1,6	2,9	3,9	-4,5	-2,7	−5 to +5
HCO3	24,8	26,4	27,0	20,9	22,4	18 – 26
Urea (mmol/L)	17,7	22,0	9,7	7,5	7,7	1.5 – 6.0
Creatinine (mkmol/L)	27,1	24,3	17,7	16,8	17,0	35 – 90
Diuresis (ml/kg/h)	7,2	1,8	8,0	7,5	8,5	1.0 – 4.0

vious relationship, platelets show an inverse association with procalcitonin. An increase in platelet levels along with a decrease in procalcitonin may signify clinical improvement;

5. CRP and Procalcitonin (0.98). The very strong positive correlation suggests a parallel decline in both markers as the inflammatory process subsides. CRP and procalcitonin are often used together to assess the severity of inflammation and monitor treatment effectiveness.

Conclusions:

• The data indicate an appropriate physiological response to therapy: a reduction in CRP and procalcitonin is associated with an improvement in the patient's condition.

• Leukocytes and platelets gradually recover, confirming a positive clinical trajectory.

• The strong positive correlation between CRP and procalcitonin supports their use as reliable markers for monitoring the inflammatory process.

As shown in Figure 1, both strong negative and positive correlations were observed among inflammatory markers.

In this single-case report, correlation analysis was used exclusively as an exploratory visualization tool. The heatmap illustrates temporal patterns and co-variation of laboratory and clinical parameters within one patient and is not intended to support statistical inference or causal interpretation.

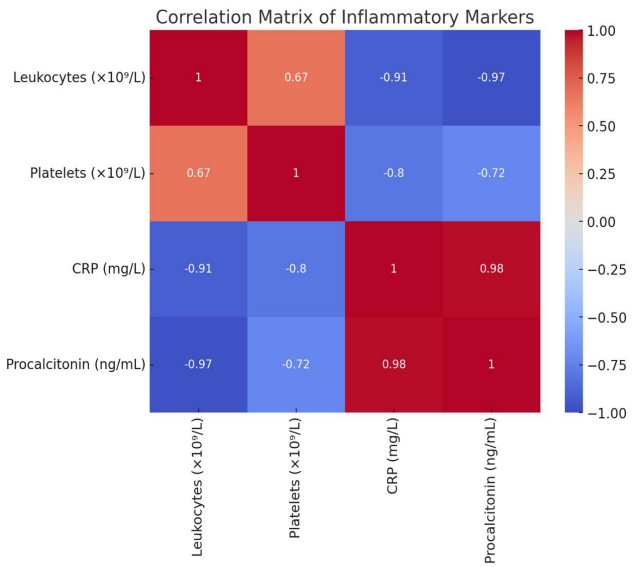

Figure 1 – Correlation matrix of inflammatory markers in the neonate before and after hemodiafiltration.

On the second day after hemofiltration in the neonatal surgery department, following the stabilization of the patient's condition, a second operation was performed in the operating room: gastrostomy reconstruction and anterior abdominal wall repair. On the third day, a gradual reduction of mechanical ventilation parameters was conducted, followed by extubation. Adrenaline titration was completely discontinued, the dopamine dose was reduced to 3 µg/kg/min, and an increase in enteral feeding volume was noted. On the twelfth day, the patient was transferred to a specialized department for further treatment and dynamic observation.

This clinical case demonstrates that hemofiltration (HF) in a newborn with neonatal sepsis contributes to interrupting the progression of the systemic inflammatory response and multiple organ dysfunction syndrome (MODS), thereby promoting hemodynamic stabilization and metabolic recovery [1, 3, 4]. The use of extracorporeal therapies in newborns presents a significant clinical and technical challenge due to the anatomical and physiological characteristics of the neonatal period. Immature homeostatic mechanisms, the tendency toward hemodynamic instability, low circulating blood volume, and incomplete renal and hepatic maturation substantially limit the feasibility of extracorporeal detoxification procedures such as continuous renal replacement therapy (CRRT) or hemofiltration [8, 9, 11].

Several studies have shown that the integration of hemoperfusion or hemoadsorption with CRRT can enhance the removal of inflammatory mediators, stabilize the internal milieu, and improve outcomes in pediatric and neonatal septic shock [12]. In particular, the use of CytoSorb® and HA330 cartridges has demonstrated potential benefits in cytokine clearance and organ function recovery when conventional therapy alone is insufficient [12-13].

However, extracorporeal blood purification in neonates is associated with additional risks, primarily related to vascular access and the need for systemic anticoagulation, which increase the likelihood of hemorrhagic complications [13]. These considerations necessitate careful patient selection, close monitoring of coagulation parameters, and performance of hemofiltration in specialized centers with experienced multidisciplinary teams. Emerging evidence suggests that early initiation of HF or CRRT in critically ill neonates may attenuate systemic inflammation, reduce endotoxin burden, and modulate immune activation, which may partly explain the favorable clinical course observed in this case. Despite procedural complexity and potential risks, hemofiltration may represent a viable adjunctive therapeutic option in selected neonates with refractory septic shock and MODS when conventional therapy fails [14].

The decision to initiate prolonged veno-venous hemofiltration (PVVHF) was based on a comprehensive clinical assessment rather than on isolated renal criteria alone. Although neonatal-specific KDIGO criteria for acute kidney injury (AKI) were considered, the indication for extracorporeal therapy in this case was primarily driven by progressive septic shock complicated by multiple organ dysfunction syndrome (MODS), refractory metabolic acidosis, hemodynamic instability, and evolving fluid imbalance.

Despite ongoing conventional supportive management, including optimized antimicrobial therapy, vasoactive support, mechanical ventilation, fluid resuscitation, and diuretic therapy, the patient demonstrated persistent clinical deterioration. In this context, PVVHF was initiated as an adjunctive rescue therapy to provide metabolic control, support organ function, and mitigate systemic inflammatory burden.

Given the absence of universally accepted thresholds for CRRT initiation in neonates with septic MODS, the timing of PVVHF initiation was guided by dynamic clinical progression rather than predefined laboratory cut-offs. This approach is consistent with contemporary neonatal intensive care practice, where extracorporeal therapies are increasingly considered in severe, refractory cases beyond isolated renal indications.

Therapeutic Effectiveness Was Evident in the Following Aspects:

1. Correction of Fluid and Electrolyte Balance: Normalization of hydration status, resolution of hyperhydration, and restoration of stable hemodynamics;

2. Removal of Endogenous and Exogenous Toxins: Reduction of urea, creatinine, and other metabolites contributing to toxic syndrome;

3. Stabilization of Acid-Base Balance (ABB): Correction of metabolic acidosis and restoration of the body's buffer systems;

4. Optimization of Diuresis: Recovery of adequate renal function, demonstrated by an increase in spontaneous dieresis;

5. Reduction of MODS Manifestations: Improvement in the patient's overall condition, normalization of hemodynamic and gas exchange parameters;

6. Hemodynamic Stabilization: Evidenced by an increase in mean arterial pressure and reduced need for vasopressor support. Adrenaline was discontinued, and the dopamine dose was reduced. Blood pressure showed a positive trend, rising from 60/30 mmHg to 90/53 mmHg, indicating improved hemodynamic status;

7. Restoration of Respiratory Function: Successful weaning from mechanical ventilation and transition to spontaneous breathing, resulting in a shorter ventilation period;

8. Renal Function Recovery: Restoration of the kidneys' filtration capacity, normalization of diuresis without additional diuretic stimulation, and decreased severity of acute kidney injury (AKI);

9. Regression of Systemic Bacterial Inflammation: Reduction in procalcitonin, CRP levels, leukocytosis, and neutrophil response;

10. Shortened Hospitalization Duration: Reduced length of stay in the intensive care unit and overall hospitalization period.

The improvement in vital signs was accompanied by a positive dynamic of the underlying disease, allowing for gastrostomy reconstruction on the second day after completing hemofiltration.

Thus, this clinical case confirms the high efficacy and safety of HDF in newborns, provided there is strict monitoring and an individualized approach to treatment strategy selection.

Hemofiltration (HF) represents one of the most advanced and widely adopted modalities of extracorporeal blood purification in the management of septic shock. Although its use in pediatric intensive care is well established, the implementation in neonatology remains limited due to technical constraints and the fragility of this patient group [1, 4, 8, 9]. In the presented clinical case, hemofiltration contributed not only to the stabilization of the patient's hemodynamic and metabolic status but also to the prevention of secondary complications and a noticeable reduction in hospitalization duration [7, 10].

The use of continuous veno-venous hemofiltration (CVVH) in neonates within intensive care units has been reported in several studies, including Continuous Renal Replacement Therapy in Preterm Infants [8]. This prospective registry analyzed infants ≤ 10 kg who underwent CRRT, revealing an overall survival rate of about 42 % among both term and preterm neonates, with a minimum treatment weight of 1.9 kg. These findings are consistent with European registry data and single-center experiences highlighting both the feasibility and safety of extracorporeal support in infants with severe sepsis or MODS [9, 10].

Nevertheless, the reviewed literature provides insufficient evidence regarding the application of HF in extremely preterm infants, despite its growing use and promising results in clinical practice [8, 9, 11]. This underlines the urgent need for further prospective and multicenter investigations to evaluate the safety, hemodynamic tolerance, and long-term outcomes of HF in this patient population [6, 11, 14].

Existing publications are predominantly retrospective and limited by small cohorts and heterogeneous patient profiles - from extremely preterm infants with severe infections to late preterm neonates with complex congenital anomalies [9, 10, 13]. Moreover, earlier attempts at neonatal hemofiltration were hindered by the large extracorporeal circuit volume, standard hemofilters with high priming requirements, and the risk of hemodilution and hypotension [7, 13]. Recent technological advances, including low-volume ST60 filters and refined anticoagulation protocols, have significantly improved procedural safety and broadened the clinical applicability of HF in neonates [2, 3, 12].

In conclusion, the present case confirms that hemofiltration using the ST60 cartridge can be successfully implemented in neonatal practice as an effective and relatively safe adjunctive therapy for severe sepsis and multiple organ dysfunction syndrome. Nevertheless, to validate these findings and establish evidence-based guidelines, further multicenter clinical trials are warranted to define optimal timing, dosing, and patient selection criteria [1-14].

This report describes a single clinical case, which inherently limits the generalizability of the findings. The observational nature of the data precludes causal inference regarding the effectiveness of prolonged veno-venous hemofiltration. In addition, the absence of a control group and standardized neonatal criteria for extracorporeal therapy initiation further restricts interpretation. Therefore, the presented findings should be considered hypothesis-generating and serve primarily to illustrate feasibility and clinical decision-making in a highly selected patient population.

DISCUSSION

As this manuscript presents a single descriptive clinical case, the generalizability of the observed findings is inherently limited. Although a favorable clinical and laboratory trajectory was temporally associated with the initiation of prolonged veno-venous hemofiltration (PVVHF), these observations should not be construed as definitive evidence of the efficacy or safety of this extracorporeal modality in the broader neonatal population. Causal inference cannot be established based on an isolated case, and the results must therefore be interpreted with appropriate caution.

Within this clinical context, extracorporeal blood purification techniques, including PVVHF, should be conceptualized primarily as supportive or rescue interventions rather than as curative or standalone therapeutic strategies. Their applica-

tion is typically reserved for critically ill neonates with severe, refractory sepsis complicated by multiple organ dysfunction syndrome (MODS), in whom conventional medical management fails to achieve adequate physiological stabilization. The rationale for employing PVVHF in such settings is grounded in its potential to modulate the systemic inflammatory response through the removal of circulating inflammatory mediators, correction of metabolic derangements, and optimization of fluid balance, thereby creating more favorable conditions for endogenous recovery and the effectiveness of concomitant therapies.

Importantly, the clinical and biochemical improvements observed in this case most likely reflect the cumulative and synergistic effects of comprehensive multimodal intensive care rather than the isolated impact of PVVHF alone. The patient received timely and targeted antimicrobial therapy, advanced hemodynamic support, meticulous respiratory management, and organ-supportive measures, all of which are fundamental components of contemporary neonatal sepsis management. In this framework, PVVHF functioned as an adjunctive therapy, potentially facilitating stabilization by supporting metabolic and inflammatory homeostasis, rather than acting as the primary determinant of clinical outcome.

Consequently, while this case highlights the potential feasibility and tolerability of PVVHF as part of an integrated therapeutic approach in severe neonatal sepsis, it does not permit conclusions regarding its independent therapeutic benefit. Further evidence derived from multicenter, prospective studies with standardized indications, treatment protocols, and outcome measures is required to define the precise role of extracorporeal blood purification techniques in neonatal sepsis and MODS.

CONCLUSION

This case highlights the potential feasibility of prolonged veno-venous hemofiltration as an adjunctive supportive therapy in a critically ill neonate with severe sepsis and MODS. Rather than providing therapeutic validation, the present report aims to contribute hypothesis-generating clinical observations and to illustrate practical aspects of extracorporeal therapy implementation in a highly vulnerable population.

Given the limited availability of neonatal extracorporeal blood purification in certain regions, including Kazakhstan, this experience may be of particular relevance for centers developing advanced intensive care capabilities. Further prospective, multicenter studies are required to define optimal indications, timing, and outcomes of PVVHF in neonatal sepsis.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ETHICAL STATEMENT

Ethical approval was waived for this study, as it represents a single clinical case report and did not involve any experimental intervention. The report was prepared in accordance with the principles of the Declaration of Helsinki. Written informed consent for participation and publication of clinical data was obtained from the patient's parents.

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AUTHOR CONTRIBUTIONS

Conceptualization, T.I.; Data collection and clinical investigation, G.Z.; Formal analysis and visualization, G.Z.; Resources and supervision, D.B.; Writing – original draft preparation, G.Z.; Writing – review and editing, T.I. and D.B. All authors have read and agreed to the published version of the manuscript.

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НЕОНАТАЛЬДЫ СЕПСИС ЖӘНЕ ЭКСТРАКОРПОРАЛЬДЫ ТЕРАПИЯ ӘДІСТЕРІН ҚОЛДАНУ: КЛИНИКАЛЫҚ ЖАҒДАЙ

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АҢДАТПА

Неонатальды сепсис жаңа туған нәрестелер арасындағы өлім-жітімнің негізгі себептерінің бірі болып қала береді. Бұл популяцияда экстракорпоральды қан тазарту әдістерін қолдануға қатысты деректердің шектеулілігі қосымша клиникалық бақылаулардың қажеттілігін көрсетеді. Осы мақалада *Klebsiella pneumoniae* ESBL (10^7 КТБ/мл) тудыратын сепсисі бар жаңа туған нәрестеде гемофильтрацияны қолданудың Қазақстандағы алғашқы табысты клиникалық жағдайы сипатталады. Туа біткен ақаулары және ерте неонатальды сепсисі бар нәрестенің клиникалық ағымы баяндалған. Реанимация бөлімінде ST60 педиатриялық гемофильтрын пайдалана отырып, үздіксіз вено-венозды гемофильтрация (CVVH) жүргізілді. Мониторинг құрамына гемодинамикалық көрсеткіштерді, қабыну маркерлерін, коагулограмма көрсеткіштерін, диурезді және қышқыл-сілтілік тепе-теңдікті бағалау кірді. CVVH жүргізу нәтижесінде гемодинамика тұрақтанды, лактат деңгейі төмендеді (4,5-тен 1,6 ммоль/л дейін), диурез қалыпқа келді, қабыну маркерлері азайды (CRP 297-ден 19 мг/л дейін, прокальцитонин 24,7-ден 1,1 нг/мл дейін), тромбоциттер саны қалпына келді (11-ден 93×10^9/л дейін). Вазопрессор дозалары төмендеп, реконструктивті операция жасауға мүмкіндік туды. Науқас сәтті экстубацияланып, бейінді бөлімге ауыстырылды. Бұл клиникалық жағдай гемофильтрацияның сепсис пен полиоргандық жеткіліксіздігі бар жаңа туған нәрестелердегі тиімділігі мен салыстырмалы қауіпсіздігін көрсетеді. Әдіс стандартты ем нәтижесіз болған кезде перспективалы терапиялық нұсқа ретінде қарастырылуы мүмкін және көпорталықты зерттеулердің қажеттілігін айқындайды.

Түйінді сөздер: жаңа туған нәрестелер; неонатальды сепсис; экстракорпоральды қан тазарту; гемофильтрация; көп мүшелік жеткіліксіздік синдромы.

НЕОНАТАЛЬНЫЙ СЕПСИС И ПРИМЕНЕНИЕ ЭФФЕРЕНТНЫХ МЕТОДОВ ТЕРАПИИ: КЛИНИЧЕСКИЙ СЛУЧАЙ

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АННОТАЦИЯ

Неонатальный сепсис остаётся одной из ведущих причин смертности среди новорождённых. Ограниченные данные об использовании методов экстракорпоральной очистки крови в данной популяции указывают на необходимость дальнейших клинических наблюдений. В настоящей статье представлен первый успешный случай в Казахстане применения гемофильтрации у новорождённого с сепсисом, вызванным *Klebsiella pneumoniae* ESBL (10^7 КОЕ/мл). Описано клиническое течение новорождённого с врождёнными пороками развития и ранним неонатальным сепсисом, обусловленным *Klebsiella pneumoniae* ESBL (10^7 КОЕ/мл). В условиях отделения интенсивной терапии была проведена непрерывная вено-венозная гемофильтрация (CVVH) с использованием педиатрического гемофильтра ST60. Мониторинг включал оценку гемодинамических показателей, лабораторных маркеров воспаления, коагулограмму, диурез и кислотно-щелочной баланс. Проведение CVVH способствовало стабилизации гемодинамики, снижению уровня лактата (с 4,5 до 1,6 ммоль/л), нормализации диуреза, снижению воспалительных маркеров (CRP с 297 до 19 мг/л; про-

кальцитонина с 24,7 до 1,1 нг/мл) и восстановлению количества тромбоцитов (с 11 до 93×10⁹/л). На фоне терапии отмечалось снижение доз вазопрессоров, что позволило выполнить реконструктивное хирургическое вмешательство. Пациент был успешно экстубирован и переведён в специализированное отделение. Представленный клинический случай демонстрирует эффективность и относительную безопасность гемофильтрации у новорождённых с сепсисом и синдромом полиорганной недостаточности. Метод может рассматриваться как перспективный вариант терапии при неэффективности стандартного лечения, что подчёркивает необходимость дальнейших многоцентровых исследований.

Ключевые слова: новорождённые; неонатальный сепсис; экстракорпоральная очистка крови; гемофильтрация; синдром полиорганной недостаточности.