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Predictors of Mortality Correlated with the SOFA Score in Pediatric VA-ECMO Patients

Pediatrik VA-ECMO Hastalarında SOFA Skoru ile Korelasyon Gösteren Mortalite Belirleyicileri

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ABSTRACT

Background: The objective of this study was to analyze mortality predictors in pediatric VA-ECMO patients, correlating these predictors with the pediatric sequential organ failure assessment score (pSOFA).

Aim: To enhance prognostic accuracy and support individualized clinical decision-making by evaluating the correlations between mortality predictors and pediatric sequential organ failure assessment (pSOFA) scores in pediatric VA-ECMO patients.

Methods: We conducted a retrospective analysis of 80 consecutive pediatric VA-ECMO cases treated at our center between April 2018 and October 2021. Data collection included patient demographics, clinical features, pSOFA scores, and estimated mortality risks. Survival impacts and morbidity factors were also assessed. The overall decannulation and hospital discharge rates were recorded, with a particular focus on patients with congenital cardiac diseases and those experiencing postcardiotomy low cardiac output, who showed the highest survival rates.

Results: Our analysis revealed that certain variables significantly influenced survival outcomes in pediatric VA-ECMO patients. These variables included age, weight, genetic disorders, inotropic support, inhaled nitric oxide (NO) usage, hemodiafiltration, duration of hospital stay, active cardiopulmonary resuscitation during cannulation, and various biochemical markers. Notably, the mean pSOFA scores were significantly lower in survivors compared to non-survivors (9.22 ± 1.43 vs. 13.06 ± 2.69, respectively). Overall decannulation and hospital discharge rates were 60% and 48.75%, respectively, with the highest rates observed in patients with congenital cardiac diseases and postcardiotomy low cardiac output (84.6% and 76.9%, respectively). Furthermore, several mortality predictors were identified, which correlated strongly with pSOFA scores. These predictors included the need for inotropic support, elevated levels of lactate and creatinine, a low protein/albumin ratio, and a low pH prior to cannulation. These findings underscore the critical importance of assessing the severity of organ failure and the overall clinical status when determining mortality risk in pediatric VA-ECMO patients.

Conclusion: This study offers valuable insights into the association between pSOFA scores and mortality predictors in pediatric ECMO cases. The significant correlation between higher pSOFA scores and increased mortality highlights the necessity for comprehensive risk assessment and vigilant monitoring of clinical status to optimize patient outcomes. Our findings support the integration of pSOFA scores into routine clinical practice for more effective prognostication and individualized patient management in pediatric VA-ECMO.

Keywords: mortality, extracorporeal membrane oxygenation, pSOFA score

ÖZET

Arkaplan: Bu çalışmanın amacı, pediatrik VA-ECMO hastalarında mortalite belirleyicilerini analiz etmek ve bunları pediatrik sıralı organ yetmezliği değerlendirme skoru (pSOFA) ile ilişkilendirmektir.

Amaç: Pediatrik VA-ECMO hastalarında mortalite belirleyicileri ile pediatrik sıralı organ yetmezliği değerlendirme (pSOFA) skorları arasındaki ilişkiyi değerlendirerek, prognostik doğruluğu artırmak ve bireyselleştirilmiş klinik karar süreçlerini desteklemek.

Yöntemler: Çalışmamızda Nisan 2018 ve Ekim 2021 tarihleri arasında merkezimizde tedavi edilen 80 ardışık pediatrik VA-ECMO vakasının retrospektif bir analizi yapılmıştır. Veriler, hasta demografisi, klinik özellikleri, pSOFA skorları ve tahmini mortalite risklerini içermektedir. Sağkalım etkileri ve morbidite faktörleri de değerlendirilmiştir. En yüksek sağkalım oranlarını gösteren konjenital kalp hastalıkları olan ve postkardiyotomi düşük kalp debisi yaşayan hastalara özellikle odaklanılarak, genel dekanülasyon ve hastaneden taburculuk oranları kaydedilmiştir.

Bulgular: Analizimiz, bazı değişkenlerin pediatrik VA-ECMO hastalarında sağkalım sonuçlarını önemli ölçüde etkilediğini ortaya koymuştur. Bu değişkenler arasında yaş, kilo, genetik bozukluklar, inotropik destek, inhale nitrik oksit (NO) kullanımı, hemodiyafiltrasyon, hastanede kalış süresi, kanülasyon sırasında aktif kardiyopulmoner resüsitasyon ve çeşitli biyokimyasal belirteçler yer almaktadır. Özellikle, ortalama pSOFA skorları hayatta kalanlarda hayatta kalmayanlara kıyasla anlamlı derecede düşük bulunmuştur (sırasıyla 9,22 ± 1,43 vs. 13,06 ± 2,69). Genel dekanülasyon ve hastaneden taburculuk oranları sırasıyla %60 ve %48,75 olup en yüksek oranlar konjenital kalp hastalıkları ve postkardiyotomi düşük kalp debisi olan hastalarda gözlenmiştir (sırasıyla %84,6 ve %76,9). Ayrıca, pSOFA skorları ile güçlü korelasyon gösteren birkaç mortalite belirleyicisi tanımlanmıştır. Bu belirleyiciler arasında inotropik destek ihtiyacı, yüksek laktat ve kreatinin seviyeleri, düşük protein/albümin oranı ve kanülasyon öncesinde düşük pH yer almaktadır. Bu bulgular, pediatrik VA-ECMO hastalarında mortalite riskini belirlerken organ yetmezliğinin ciddiyetini ve genel klinik durumu değerlendirmenin kritik öneminin altını çizmektedir.

Sonuç: Bu çalışma, pediatrik ECMO vakalarında pSOFA skorları ile mortalite öngörücüleri arasındaki ilişkiye dair değerli bilgiler sunmaktadır. Yüksek pSOFA skorları ile artmış mortalite arasındaki anlamlı korelasyon, hasta sonuçlarını optimize etmek için kapsamlı risk değerlendirmesi ve klinik durumun dikkatli bir şekilde izlenmesi gerekliliğini vurgulamaktadır. Bulgularımız, pediatrik VA-ECMO'da daha etkili prognostik değerlendirme ve bireyselleştirilmiş hasta yönetimi için pSOFA skorlarının rutin klinik uygulamaya entegre edilmesini desteklemektedir.

Anahtar kelimeler: mortalite, ekstrakorporeal membran oksijenasyonu, pSOFA skoru

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Introduction

In the last half-century, extracorporeal membrane oxygenation (ECMO) has emerged as a critical intervention for enhancing the survival rates of critically ill patients requiring hemodynamic and respiratory support. Venovenous ECMO (VV-ECMO) serves to support respiratory function in individuals with respiratory failure and relatively preserved cardiac function, whereas venoarterial ECMO (VA-ECMO) offers both respiratory and cardiac assistance to patients experiencing hemodynamic instability and compromised cardiac function.[1-2] The Extracorporeal Life Support Organization (ELSO) registry, established in 1989, has been instrumental in accumulating valuable data on ECMO utilization.[3] Since its inception, clinicians have consistently strived to achieve improved outcomes with ECMO therapy.

This study endeavors to examine the prognostic factors influencing mortality among pediatric patients undergoing VA-ECMO, with a specific focus on elucidating the correlation between mortality predictors and the pediatric sequential organ failure assessment score (pSOFA).

Material and Methods

Study Population

Between April 2018 and October 2021, a cohort of 80 consecutive patients undergoing venoarterial ECMO (VA-ECMO) was recruited for this study. Various clinical and biochemical factors were meticulously assessed to ascertain their influence on both survival rates and morbidity outcomes. These factors encompassed parameters previously examined in literature as well as those hypothesized to impact outcomes. Data collected included patients' ages, dates of decannulation and discharge from the hospital, demographic details, primary diagnoses, duration of ECMO support, length of stay in the intensive care unit and hospital, echocardiographic findings, serum markers, and utilization of inotropic support and inhaled nitric oxide (NO) treatment. The inclusion and exclusion criteria of our study were as follows: All pediatric patients (<18 years) who received VA-ECMO support at our center between April 2018 and October 2021 were included, provided that complete demographic, clinical, and biochemical data, including pSOFA scores, were available. Patients supported with VV-ECMO only, those with incomplete or missing medical records, and those in whom ECMO support was terminated within the first 6 hours due to technical problems or early mortality were excluded from the analysis. This retrospective study, conducted at a single center, received approval from the institutional review board and adhered to the principles outlined in the Declaration of Helsinki (Human research ethics committee details; date of approval, the protocol number: 03/12/2024, 2024/126). All parents provided informed consent for their children's participation in the study.

Indications

Indications for ECMO support encompassed a spectrum of conditions, including dilated and restrictive cardiomyopathies, myocarditis, congenital heart diseases, postcardiotomy low cardiac output in the intensive care unit (ICU), failure to wean from cardiopulmonary bypass during surgery, respiratory failure, and extracorporeal cardiopulmonary resuscitation (eCPR) for various comorbidities.

Patient Demographics and Clinical Features

A summary of patient demographics, clinical features, primary diagnoses, pediatric sequential organ failure assessment (pSOFA) scores, and estimated mortality risk percentages is provided in Table 1. Notably, the majority of patients were male (53.7%), with a median age of 6 years (range: 0.1-25 years) and a median weight of 21 kilograms (range: 2.3-78 kg). Primary diagnoses were predominantly dilated cardiomyopathy (26.25%) and congenital cardiac diseases (32.5%), followed by respiratory diseases such as pneumonia and acute respiratory distress syndrome (ARDS) (16.25%), myocarditis (8.75%), and restrictive cardiomyopathy (2.5%).

The ECMO Procedure and Management

ECMO implantation was conducted through the right common carotid artery and internal jugular vein using a cut-down technique for patients weighing less than 15 kg; otherwise, the femoral vessels were utilized. Intraoperative ECMO was instituted via cen-

Table 1. Baseline characteristics of patients

Variables (n:80)	
Age (years) (median)(min-max)	6 (0.1-25)
Gender (male) n (%)	43 (53.7%)
Weight (kg) (median)(min-max)	21 (2.3-78)
Height (cm) (median)(min-max)	82 (48-175)
Genetic disorder n (%)	8 (10%)
Adrenaline infusion n (%)	68 (85%)
Cannulation during CPR n, (%)	15 (18.75%)
Primary diagnosis	
Dilated cardiomyopathy n (%)	21 (26.25%)
Restrictive cardiomyopathy n (%)	2 (2.5%)
Myocarditis n (%)	7 (8.75%)
Congenital cardiac disease n (%) (Postcardiotomy low cardiac output)	26 (32.5%)
Respiratory diseases (Pneumonia, ARDS)	13 (16.25%)
E CPR (malignancy, sepsis, intoxication)	11 (13.75%)
pSOFA score (mean ± SD)	12.20 ± 2.944
Estimated Mortality Risk (n %)	
<10%	0 (0%)
15-20%	12 (15%)
40-50%	35 (43.8%)
50-60%	18 (22.5%)
>80%	6 (7.5%)
>90%	9 (11.3%)

CPR: cardiopulmonary resuscitation, pSOFA: pediatric sequential organ failure assessment

tral thoracic cannulation in patients diagnosed with postcardiotomy low cardiac output, with the arterial cannula inserted into the ascending aorta and the venous cannula into the right atrium.

The ECMO circuit comprised a centrifugal pump (Jostra RotaFlow centrifugal pump, Maquet, Hirrlingen, Germany), a pediatric membrane oxygenator (Quadrox PLS MAQUET Cardiovascular, Hirrlingen, Germany), and an integrated heat exchanger. The circuit was primed with bank blood products (packed red blood cells) and a standard solution containing 0.9% sodium chloride. Systemic heparin was administered to maintain an activated clotting time of 180 to 200 seconds. Hematocrit levels were maintained at 30–35% through packed red blood cell transfusions, with platelet transfusions administered when platelet counts decreased.

Sedation was achieved with routine use of midazolam and fentanyl. Pediatric patients were typically ventilated in synchronized intermittent mandatory ventilation (SIMV) mode at 10–15 breaths/min. Tidal volume was halved with a positive end-expiratory pressure of 4–8 mmHg to prevent alveolar collapse. Mechanical ventilation rates were adjusted to oxygenate blood of native cardiac output and prevent lung atelectasis.

The pump flow was initiated at 100 mL/kg/min and adjusted to ensure adequate end-organ per-

Table 2. Survival and decannulation rates according to primary diagnosis

Primary Diseases	All n %	Decannulation n,%	Discharge from hospital n,%
Dilated cardiomyopathy n (%)	21 (26,25%)	8 (38%)	6 (28.5%)
Restrictive cardiomyopathy n(%)	2 (2.5%)	0 (0%)	0 (0%)
Myocarditis n (%)	7 (8.75%)	5 (71.4%)	4 (57.1%)
Congenital cardiac disease n (%) (Postcardiotomy low cardiac output)	26 (32.5%)	22 (84.6%)	20 (76.9%)
Respiratory diseases (Pneumonia, ARDS)	13 (16.25%)	8 (61.5%)	6 (46.1%)
E-CPR (malignancy, sepsis, intoxication)	11 (13,75%)	5 (45,4%)	3 (27.2%)
General results	80 (100%)	48 (60%)	39 (48.75%)

E-CPR: extracorporeal cardiopulmonary resuscitation, ARDS: acute respiratory distress syndrome

fusion, normalization of arterial blood gases, increased systemic venous saturation, and clearance of lactic acidosis. Inotropic agents were administered to support left heart function and pulsatility. Nitric oxide was employed in children with refractory pulmonary hypertension.

Weaning and decannulation were accomplished with optimal ventilator and inotropic support. Myocardial function was assessed by echocardiography prior to weaning. Weaning commenced cautiously when left ventricular ejection fraction approached 40% and respiratory status improved. Pump flow was gradually reduced 24 hours before weaning until approximately 25% of maximal support. ECMO explantation was conducted under sterile conditions in the ICU. ECMO therapy was discontinued in patients experiencing severe complications such as intractable bleeding. Repair of vessels in patients with neck cannulation was performed using purse-string sutures following successful weaning from ECMO.

Statistical Analysis

Demographics and patient characteristics were analyzed using IBM SPSS 15.0. Categorical variables were expressed as percentages and analyzed using the Pearson chi-squared test, while the Fisher exact test was used for nonconsecutive variables. The Mann-Whitney U test was employed for consecutive variables, with a significance level set at $p < 0.05$ for a confidence interval of 95%.

The survival analysis was performed using the Kaplan-Meier method, which estimates the survival function from lifetime data. The data included pSOFA scores of 7, 8, 9, 10, 11, and 12, with corresponding survival times. Confidence intervals (CIs) at 95% were calculated to provide an estimate range for survival probabilities.

Results

Survival and decannulation rates stratified by primary diagnosis are detailed in Table 2. The overall decannulation and discharge rates from the hospital were 60% and 48.75%, respectively. Notably, pediatric ECMO patients with congenital cardiac diseases and postcardiotomy low cardiac output (LCO) exhibited the highest rates of decannulation and hospital discharge (84.6% and 76.9%, respectively). Conversely, patients with cardiomyopathies experienced poorer outcomes, primarily attributed to a shortage of cardiac donors and prolonged waiting times for heart transplants in our country. Specifically, the decannulation rate was 38% for dilated cardiomyopathy and 0% for restrictive cardiomyopathy.

A comparison of variables between survivors and non-survivors prior to and during ECMO support is summarized in Table 3. Variables assessed included age, weight, genetic disorders, inotropic support, inhaled nitric oxide (NO) support, hemodiafiltration, duration of hospital stay, active cardiopulmonary resuscitation during cannulation, pediatric sequential

Table 3. Patient and management variables associated with survival

Variables		Survivors	Non-survivors	P value
Age (years) (median)(min-max)		5 (0.4-17)	6 (0.1-25)	0.100
Weight (median)(min-max)		22 (4-54)	21 (2.3-78)	0.210
Genetic disorder n, (%)		2 (11%)	6 (9.6%)	1
Adrenaline infusion n, (%)		6 (33.3%)	41 (100%)	<0.001*
Inhaled NO n, (%)		2 (11.1%)	14 (22.5%)	0.340
Haemofiltration n, (%)		3 (16,6%)	11 (17,7%)	1
Hospital stay (days) (median)(min-max)		48 (12-98)	18 (1-96)	<0.001*
Cannulation during CPR n, (%)		4 (22.2%)	11 (17.7%)	1
pSOFA score (points) (mean±SD)		9.22 ± 1.43	13.06 ± 2.69	<0.001*
Lactate (mmol/L) (median)(min-max)	Initial	5.8 (0.8-34)	5.6 (0.5-27)	1
	During ECMO	2.9 (0.8-138)	4.9 (1.1-131)	0.870
Creatinine (mg/dL)	Initial (med)(min-max)	0.52 (0.2-1.29)	0.63 (0.09-2.7)	0.002*
	During ECMO (mean±SD)	0.63 ± 0.44	0.86 ± 0.57	0.005*
Protein/albumin (g/L) (mean±SD)	Initial	5.10±0.96 / 3.13±0.61	5.1±1.19 / 3.02±0.72	0.004*
	During ECMO	5.12±1.15 / 3.11±1.07	4.4±1.07 / 2.6±0.86	0.003*
AST/ALT (U/L) (median)(min-max)	Initial	61 (18-2482) / 26 (10-1585)	69 (10-8099) / 35 (7-4284)	0.006
	During ECMO	82 (22-7112) / 35 (12-4326)	256 (11-23101) / 108 (5-9544)	0.008
pH (median)(min-max)	Initial	7.36 (6.8-7.4)	7.31 (6.8-7.6)	0.024
	During ECMO	7.42 (7.18-7.67)	7.38 (7.09-7.55)	<0.001*
BE (median)(min-max)	Initial	-8 (-24- 1)	-8 (-24- 6)	0.020
	During ECMO	1 (-21- 6)	-2.5 (-21- 6)	0.010

Abbreviations: NO: nitric oxide, ECMO: extracorporeal membrane oxygenation, pSOFA: pediatric sequential organ failure assessment

organ failure assessment (pSOFA) scores, lactate, creatinine, protein, albumin, liver enzymes, pH, and base deficit levels.

The majority of patients required at least one inotropic support within six hours prior to ECMO cannulation, with milrinone and adrenaline being the most commonly administered agents. In the survivor group, the median arterial pH, creatinine, and lactate levels in the six hours preceding ECMO cannulation were 7.36 (range: 6.8-7.4), 0.52 (range: 0.2-1.29) mg/dL, and 5.8 (range: 0.8-34) mmol/L, respectively.

Table 4. Kaplan Meier Analysis

Means and Medians for Survival Time

pSOFA score	Mean				Median			
	Estimate	Std. Error	95% Confidence Interval		Esti-mate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound			Lower Bound	Upper Bound
7	16,500	1,500	13,560	19,440	15.000	.	.	.
8	36,200	13,306	10,121	62,279	34.000	26.291	.000	85.530
9	12,000	2,000	8,080	15,920	10.000	.	.	.
10	16,167	2,638	10,995	21,338	14.000	6.124	1.998	26.002
11	36,000	11,000	14,440	57,560	25.000	.	.	.
12	47,000	,000	47,000	47,000	47.000	.	.	.
Overall	25,222	4,540	16,324	34,121	18.000	5.303	7.606	28.394

a. Estimation is limited to the largest survival time if it is censored.

The median hospital length of stay was 48 days (range: 12-98 days) for survivors, inclusive of ECMO duration, whereas it was 18 days (range: 1-96 days) for non-survivors. ELSO reports from 2023 indicated survival to discharge or transfer rates of 61% for pulmonary diseases, 55% for cardiac diseases requiring ECMO support, and 41% for extracorporeal cardiopulmonary resuscitation (eCPR). Our findings suggest a 60% decannulation rate and a 48.75% hospital discharge rate among pediatric ECMO patients over the past two years, which aligns closely with ELSO reports.[4]

Evaluation of patients using scoring systems revealed a mean pSOFA score of 9.22 ± 1.43 for survivors and 13.06 ± 2.69 for non-survivors. On admission to the hospital, 33 (41.25%) patients had estimated mortality risks exceeding 50-60%.

All pre-ECMO and post-ECMO blood assay values and clinical data were recorded, and correlations between parameters and survival rates were evaluated. Inotropic support ($p < 0.001$), elevated creatinine ($p = 0.002$), low protein/albumin ratio ($p = 0.004$), and low pH ($p = 0.024$) prior to cannulation were significantly associated with mortality. During ECMO support, elevated creatinine ($p = 0.005$), low protein/albumin ratio ($p = 0.003$), and low pH ($p < 0.001$) remained significantly associated with mortality. Interestingly, lower weight, age, and genetic disorders were not statistically significant predictors of death. Active cardiopulmonary resuscitation during cannulation was more frequent in the non-survivor group but did not reach statistical significance ($p = 1$).

Lactate levels, which have been reported in the literature as a reliable prognostic marker in ECMO patients, were not found to be statistically significant predictors of mortality in our cohort. Both pre-ECMO ($p = 1$) and post-ECMO ($p = 0.87$) lactate values showed no significant association with survival outcomes.

The survival analysis was performed using the Kaplan-Meier method, which estimates the survival function from lifetime data. The data included pSOFA scores of 7, 8, 9, 10, 11, and 12, with corresponding survival times. Confidence intervals (CIs) at 95% were calculated to provide an estimate range for survival probabilities. Overall, the estimated mean survival time across all scores is 25,222 days with a standard error of 4,540 days and a 95% CI ranging from 16,324 to 34,121 days. The survival analysis indicates a clear trend where higher pSOFA scores are associated with reduced survival probabilities, reflecting the severity of preoperative organ dysfunction. The data suggests that patients with lower pSOFA scores have significantly better survival outcomes compared to those with higher scores. The significant differences in survival probabilities based on pSOFA scores highlight the need for thorough preoperative assessment and risk stratification

to optimize patient management and improve clinical outcomes. The findings indicate significant variations in survival based on pSOFA scores, highlighting the importance of preoperative assessment in prognostication and clinical decision-making. (Figure 1)

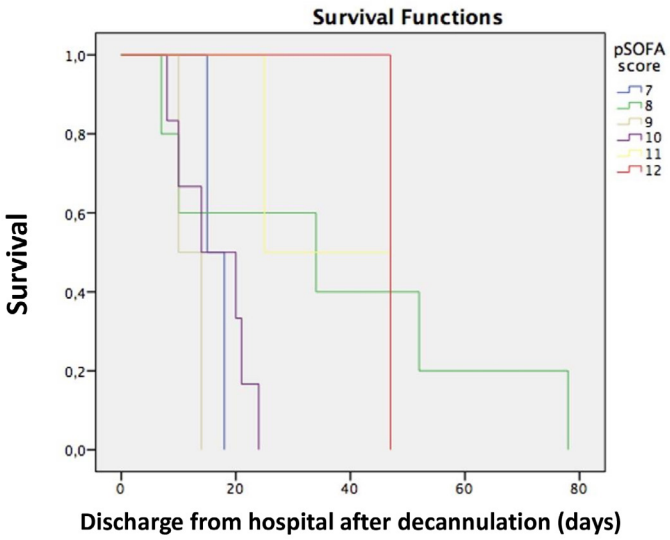


Figure 1. Kaplan Meier analysis. This analysis examines the survival probabilities of patients with different pre-surgical Sequential Organ Failure Assessment (pSOFA) scores. The study utilizes Kaplan-Meier survival curves and associated confidence intervals to assess the impact of pSOFA scores on patient outcomes.

Discussion

ECMO represents a critical intervention for both hemodynamic and respiratory support, yet despite advancements in device quality and intensive care management, its utilization still carries a considerable risk of mortality and complications such as infection, bleeding, and organ failure.[5-6] While ECMO can be life-saving, its resource-intensive nature and relatively low survival rates in children with heart disease underscore the importance of comprehensively understanding ECMO outcomes and mortality risk factors.[7]

Recent studies have identified several factors associated with worse survival outcomes, including underlying renal failure, significant bleeding prior to cannulation, and elevated lactate levels.[8-9-10] Consistent with these findings, our study observed similar associations, with variables such as inotropic support, elevated lactate and creatinine levels, genetic disorders, low protein/albumin levels, acidosis, and high pSOFA scores significantly correlated with poor outcomes. These indicators collectively suggest underlying end-organ failure, highlighting the increased severity of illness among ECMO patients.

Notably, factors related to the circumstances surrounding ECMO initiation, such as rescue cardiopulmonary resuscitation (CPR) or ECMO cannulation during active CPR, have also been linked to survival outcomes. However, these predictors likely reflect the initial severity of the underlying disease rather than being directly influenced by the interventions themselves.[11-12]

Lactate, as a marker of tissue perfusion, has emerged as a dependable marker for mortality in ECMO patients. Constantly elevated lactate levels after ECMO implantation were associated with increased mortality, underscoring the significance of monitoring lactate dynamics during ECMO support.[13-14]

The need for dialysis during ECMO, reflecting secondary organ injury due to cardiovascular collapse, is another factor strongly associated with poor prognosis. Our study's use of hemodiafiltration therapy during ECMO aligns with previous practices aimed at mitigating organ edema and reducing ECMO duration.[15-16]

Regarding ECMO duration, longer support times have been traditionally associated with poorer outcomes, attributed to complications such as inflammatory responses, coagulopathy, and end-organ failure. However, our study's finding of longer ECMO duration in survivors contradicts this trend, suggesting potential nuances in the relationship between ECMO duration and outcomes that warrant further investigation.[17-19]

Inflammatory responses during ECMO, evidenced by increased white blood cell counts, particularly neutrophils, highlight the systemic inflammatory cascade triggered by ECMO support. Endothelial activation, pro-inflammatory cytokine release, and neutrophil infiltration contribute to ECMO-associated end-organ damage.[20-24]

Utilizing scoring systems such as the pediatric sequential organ failure assessment (pSOFA) score can aid in predicting intensive care unit (ICU) outcomes and optimizing resource allocation. Our rou-

tine use of the pSOFA scoring system underscores its utility in assessing disease severity and mortality risk in critically ill pediatric patients. pSOFA scores have been shown to correlate with mortality in ECMO patients, with higher scores indicating a greater risk of death. Integration of pSOFA scores into ECMO management protocols can provide valuable prognostic information and guide clinical decision-making.[25]

Limitations

This study has several limitations. First, it is a retrospective, single-center study, which may limit the generalizability of the findings. Second, there was no long-term follow-up available for these patients, which restricted the evaluation of outcomes beyond hospital discharge. Third, the absence of external validation may limit the applicability of our results to other patient populations and institutions. Future multicenter prospective studies are needed to confirm and expand upon our findings.

In conclusion, our study underscores the importance of identifying predictors of poor outcomes in ECMO patients, such as inotropic support, elevated lactate and creatinine levels, low protein/albumin ratio, low pH prior to cannulation, and high pSOFA scores. Future research efforts should continue to explore the role of pSOFA scores and other prognostic indicators in improving ECMO outcomes, with the aim of developing more effective risk stratification tools and treatment strategies for pediatric patients requiring ECMO support.

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