



ORIGINAL ARTICLE

Predictive factors of mortality in pediatric patients with acute renal injury associated with sepsis^{☆,☆☆}

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KEYWORDS

Acute kidney injury;
Sepsis;
Predictive factors;
Mortality

Abstract

Objective: To evaluate the prognosis factors of children with sepsis and acute kidney injury.

Methods: This was a retrospective study of children with sepsis and acute kidney injury that were admitted to the pediatric intensive care unit (PICU) of a tertiary hospital. A multivariate analysis was performed to compare risk factors for mortality.

Results: Seventy-seven children (47 males) were retrospectively studied, median age of 4 months. Mean length of hospital stay was 7.33 ± 0.16 days, 68.9% of patients received mechanical ventilation, 25.9% had oligo-anuria, and peritoneal dialysis was performed in 42.8%. The pRIFLE criteria were: injury (5.2%) and failure (94.8%), and the staging system criteria were: stage 1 (14.3%), stage 2 (29.9%), and stage 3 (55.8%). The mortality rate was 33.7%. In the multivariate analysis, the risk factors for mortality were PICU length of stay (OR = 0.615, SE = 0.1377, 95% CI = 0.469–0.805, $p = 0.0004$); invasive mechanical ventilation (OR = 14.599, SE = 1.1178, 95% CI = 1.673–133.7564, $p = 0.0155$); need for dialysis (OR = 9.714, SE = 0.8088, 95% CI = 1.990–47.410, $p = 0.0049$), and hypoalbuminemia (OR = 10.484, SE = 1.1147, 95% CI = 1.179–93.200, $p = 0.035$).

Conclusions: The risk factors for mortality in children with acute kidney injury were associated with sepsis severity.

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PALAVRAS-CHAVE

Lesão renal aguda;
Sepse;
Fatores preditivos;
Mortalidade

Fatores preditivos de mortalidade em pacientes pediátricos com lesão renal aguda associada com sepse**Resumo**

Objetivos: Avaliar os fatores prognósticos de crianças com sepse e lesão renal aguda.

Métodos: Estudo retrospectivo de crianças internadas com sepse e lesão renal aguda em unidade de terapia intensiva pediátrica de serviço terciário. Usou-se a análise multivariada na comparação dos fatores de risco para mortalidade.

Resultados: Foram avaliados 77 pacientes (47 masculinos) com mediana de 4 meses de idade. A média do tempo de internação foi de $7,33 \pm 0,16$ dias, 68,9% necessitaram de ventilação mecânica, 25,9% eram oligoanúricos e 42,8% necessitaram de diálise. A classificação da lesão renal aguda foi pRIFLE I em 5,2% e F em 94,8% e estágio 1 (14,3%), estágio 2 (29,9%) e estágio 3 (55,8%). A taxa de mortalidade foi de 33,7%. Na análise multivariada os fatores de risco foram tempo de internação (OR=0,615 erro padrão=0,1377, 95% CI=0,469-0,805, $p=0,0004$), ventilação mecânica (OR=14,599, erro padrão=1,1178, 95% CI=1,673-133,7564, $p=0,0155$), necessidade de diálise (OR=9,714, erro padrão=0,8088, 95% CI=1990-47,410, $p=0,0049$) e hipoalbuminemia (OR=10,484, erro padrão=1,1147, 95% CI=1,179-93,200, $p=0,035$). No modelo de Cox a sobrevida foi influenciada pela necessidade de diálise (HR=2,952, erro padrão=0,44862, 95% CI=1,225-7,112, $p=0,016$) e hipoalbuminemia (HR=3,326, erro padrão=0,59474, 95% CI=1,037-10,670, $p=0,043$).

Conclusões: Os fatores de risco para mortalidade nas crianças com lesão renal aguda foram associados à gravidade da sepse.

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Introduction

Acute kidney injury (AKI) is a significant factor that contributes to the morbidity and mortality of children and newborns admitted to intensive care units.¹ The admission of patients with AKI to the pediatric intensive care unit (PICU) ranges between 48% and 68%.^{1,2} An association between sepsis and AKI was observed in 71.03% of the patients admitted to this PICU.

Multiple factors may be implicated in the etiology of AKI in children with sepsis.¹ The frequency of sepsis-associated AKI sepsis has increased³⁻⁵; between 10% and over 30% of cases of AKI were due to sepsis and infection.^{2,6-8} Pediatric patients with sepsis and multiple systemic organ dysfunction had lower survival rates than those with ischemia.⁴ Sepsis was associated with death in 62% of patients with AKI and was a risk factor for mortality.⁸⁻¹⁰ Children with sepsis had a ten-fold higher risk of death.⁸ There is a scarcity of publications about the risk factors for mortality in pediatric patients with AKI and sepsis. Most studies reported data on neonates and children with AKI after heart surgery.^{3,11,12}

In pediatric patients admitted to the PICU with AKI associated with hemolytic uremic syndrome or cancer, or post-heart surgery, the factors related to mortality were thrombocytopenia, age >12 years, and presence of hypoxemia and/or hypotension and/or coagulopathy.⁵ In this study, the mortality of patients with AKI was higher (29.6%) when compared with that of patients without it (2.3%).⁵ The determination of predictive factors of mortality in pediatric patients with sepsis-associated AKI may contribute to the identification of these patients, as well as the implementation of early therapeutic measures to reduce mortality.

For years, the definition of AKI was heterogeneous. The proposal to standardize the definition of AKI using the pediatric RIFLE (pRIFLE) criteria¹³⁻¹⁷ and the staging system^{14,16,18,19} favors the comparison of results between different studies. A prospective study showed that the injury and failure classification of the pRIFLE was a predictive factor of mortality in children admitted to the PICU.¹⁷

This study assessed independent predictive factors of mortality in a pediatric patient cohort with sepsis-associated AKI.

Methods**Patients, definitions, and assessed parameters**

This was a retrospective observational study of a pediatric patient cohort admitted to the PICU of Faculdade de Medicina of Botucatu, UNESP-Universidade Estadual Paulista, which is a tertiary hospital. Data were obtained from a database of patients admitted to the PICU from January 1990 to December 1994. The study included children aged 1 to 132 months of age, of both genders, admitted to the PICU with a diagnosis of sepsis and AKI.

Patients with chronic kidney disease before PICU admission and those without serum creatinine values prior to admission were excluded. Chronic kidney disease was ruled out by taking into account the clinical history, physical examination, and imaging results with normal renal ultrasonography in all patients. The creatinine level prior to PICU admission was considered as the patient's serum creatinine level up to six months before admission. AKI was diagnosed

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