Evaluation of the Underlying Factors of Acute Renal Failure in Trauma Patients Admitted to the ICU of Imam Khomeini Hospital

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ABSTRACT

Introduction: Patients at risk for acute renal failure include the elderly, those with diabetes mellitus, heart failure, liver failure, chronic kidney disease, hypotension, and bloodstream infections. The aim of this study was to investigate the underlying factors of acute lung failure in trauma patients admitted to the ICU of Imam Khomeini Hospital in Urmia. Material and Methods: Patients were classified into three categories: perrenal, renal and postrenal. The differentiation of these three categories was based on the diagnosis recorded in the file and the summary of the patient's case. Incomplete records and patients with a history of dialysis, ESRD, and GN patients who do not meet the criteria for acute renal failure were excluded. Results: Out of 10 patients with acute kidney injury, there was no case of disease and out of 110 patients without acute kidney injury, 18 (16.4%) had the disease. According to Fisher Exact test, there was no significant relationship between comorbidity and acute kidney injury (P = 0.18). Conclusion: Older patients with AKI have more severe disease and sepsis. The mortality rate in patients with AKI is higher than patients without AKI, especially in patients with oliguria. Data analysis showed that age, SAPS II, heart failure, liver cirrhosis, body fluid balance and mechanical ventilation were independently associated with 60-day mortality in these patients.

Keywords: Acute Renal Failure. ICU, Trauma
**Introduction**

Severe kidney damage leads to deterioration and sudden decline in kidney function and inability to excrete excess nitrogen products, regulate homeostasis, water and electrolytes, and acidosis. Today, the term "severe kidney damage" has largely replaced "acute renal failure." This failure is actually a syndrome that manifests itself with a rapid decrease in renal blood flow, decreased glomerular filtration rate, decreased renal excretory function, and accumulation of nitrogen excretory products. In recent years, a relative increase in serum creatinine has been shown to increase mortality [1-3]. This failure is a serious complication that occurs in 5 to 18% of patients hospitalized and in 30% of patients admitted to the intensive care unit.

The mortality rate of patients with acute renal failure in the hospital is between 28 and 90% [4-6]. This syndrome covers a wide range of diseases, which are divided into three groups: pre-renal failure (50 to 60% of cases (post-renal failure)), less than 5% of cases (and renal failure or intrinsic failure) (35 to 40% of cases). Despite advances in modern medicine, the incidence of acute renal failure has not changed in the last two decades [7-9]. Acute renal failure increases mortality as well as prolonged hospital stay in surviving patients. Despite the identification of new renal biomarkers for clinical diagnosis and better understanding of the pathophysiology of diseases, 3.13 million patients with renal failure continue to be diagnosed annually, 85% of whom are in developing countries [10]. However, in developed countries with advanced medical infrastructure, acute renal failure mainly occurs in the elderly and those who do not have a good socioeconomic status. In other countries, the cause of kidney failure is mostly due to lack of access to trained health professionals and diagnostic tests and inadequate treatment facilities and timely dialysis [11-13].

Patients at risk for acute renal failure include the elderly, those with diabetes mellitus, heart failure, liver failure, chronic kidney disease, hypotension, and bloodstream infections. The aim of this study was to investigate the underlying factors of acute lung failure in trauma patients admitted to the ICU of Imam Khomeini Hospital in Urmia.
Material and Methods

This cross-sectional descriptive-analytical study was performed on AKI, ARF, GN, ATN, AIN, Prerenal and Postrenal patients who were admitted to the intensive care unit. Patients were classified into three categories: perrenal, renal and postrenal. The differentiation of these three categories was based on the diagnosis recorded in the file and the summary of the patient's case. Incomplete records and patients with a history of dialysis, ESRD, and GN patients who do not meet the criteria for acute renal failure were excluded. After reviewing and studying each file, the necessary information was included in the checklists and then SPSS software. Descriptive results were presented as mean, percentage and standard deviation in the form of tables and graphs. Analytical results of the design depending on the quantity of the variable, t-test indirect statistical tests and chi-square or Fisher Exact test were used. For this purpose, a new version of SPSS statistical software was used. Significance level was considered less than 0.05. The plan went to the university ethics committee, and the researcher was loyal to the Helsinki Convention, and all stages of the plan were confidential. The present study was approved by the regional ethics committee of Tabriz University of Medical Sciences based on the Helsinki Declaration with the ethics code IR.UMSU.REC.1398.067 Patients entered the study after explaining the purpose of the study and how to do it to patients and if they wished. Admission to the study was completely optional and also all participants in the study, could withdraw from the study at any stage of the study, patient information will be completely confidential and the information used without mentioning the personal identity of individuals was examined. No additional treatment intervention or additional cost was imposed on patients.

Results

Out of 120 trauma patients admitted to the ICU, 34 patients (28.3%) required mechanical ventilation, and 86 patients (71.7%) did not require mechanical ventilation. Out of 10 cases of kidney injury, 7 cases (70%) had pelvic, abdominal and chest trauma and out of 110 patients who did not have kidney injury, 60 patients (54.5%) had abdominal, pelvic and chest trauma. Out of 10 cases of acute kidney injury, 5 cases (4.2%) had abdominal trauma (Fig 1 and Fig 2)
Out of 10 patients with acute kidney injury, there was no case of disease and out of 110 patients without acute kidney injury, 18 (16.4%) had the disease. According to Fisher Exact test, there was no significant relationship between comorbidity and acute kidney injury (P = 0.18). Out of 10 patients with acute kidney injury, none had diabetes and out of 110 patients without acute kidney injury, 3 (2.7%) had diabetes. According to Fisher Exact test, there was no significant relationship between diabetes and acute kidney damage (P = 0.76). Out of 10 patients with acute kidney injury, none had heart disease and out of 110 patients without acute kidney injury, 7 (6.4%) had heart disease. According to Fisher Exact test, there was no significant relationship between heart disease and acute kidney damage (P = 0.53).
Discussion

Acute kidney injury (AKI) is a global health problem [14]. However, the incidence, risk and protective factors for AKI vary according to the economic situation in different parts of the world as well as according to the hospital facilities [15-17]. Therefore, the aim of this study was to evaluate the frequency and consequences of acute renal failure in trauma patients admitted to the ICU of Imam Khomeini Hospital in a period of one year with 120 trauma patients. In our study, the incidence of acute renal impairment in trauma patients was 4.2%, which is lower than in the Santos study, and we attributed this to the use of previous definitions of AKI, which considered urinary output. We could not know in the study of santos and the differences in existing classification methods, such as KDIGO, RIFLE and AKIN (all three based on creatinine changes and / or decreased urine output) [18-20]. Also, in santos study, most cases of brain injury were a type of trauma that directly affects the kidneys by reducing glomerular perfusion. In addition, brain damage is associated with repeated use of mechanical ventilation and longer stays in the ICU [21]. The overall incidence of AKI in other studies was in the range of 16 to 39%, which is due to the progress in trauma patient care and subspecialty trauma treatment in recent years, as well as proper hydration in the study center [22-24]. In Mitra Jebel Ameli study, the relative frequency of acute kidney injury in ICU patients was reported to be 25.96%, which is higher than our study, due to the high sample size and the fact that 126 patients The patients in his study had acute renal failure before hospitalization, because we excluded patients with previous kidney damage. Other studies showed acute renal impairment of 0.4-0.9% and 4.9% in hospitalized patients [25-27]. Effective treatment of AKI is early detection of renal failure, but the standard criteria for acute renal failure (AKI), which is urinary output and elevated serum creatinine, may not be of much help in early diagnosis and early intervention, so new strategies such as Identifying risk factors and biomarkers has become important [28-30]. Acute renal failure is common in patients admitted to the intensive care unit and is associated with high mortality [31]. The cause of hospitalization, patient diagnosis, and regional socioeconomic characteristics can affect the outcome of acute renal failure. The aim was to determine the prevalence, associated factors, and mortality of acute renal injury among trauma and non-trauma patients in a general ICU of a low-income area. In one study, 279 patients were studied in the ICU for one year. Patients with chronic kidney disease and patients who stayed in the ICU for
less than 24 hours were excluded from the study. Acute kidney injury was classified into three stages according to the KDIGO system [32-34]. Comparisons were made by student-t and Mann-Whitney tests for continuous variables with and without normal distribution, respectively. Frequency comparison was performed by Fisher test. Multivariate logistic analysis was used to evaluate the variables as a predictor of acute kidney injury and death. The cause of hospitalization was approximately 51.6% of non-trauma patients and 48.4% of trauma patients. Most trauma patients had brain injury (79.5%).

Conclusion

Older patients with AKI have more severe disease and sepsis. The mortality rate in patients with AKI is higher than patients without AKI, especially in patients with oliguria. Data analysis showed that age, SAPS II, heart failure, liver cirrhosis, body fluid balance and mechanical ventilation were independently associated with 60-day mortality in these patients. Regarding the causes of acute renal failure, the results of the present study showed that most renal factors cause AKI; The results of a study on risk factors and risk factors that affect the incidence of AKI showed that hypertension, heart disease and diabetes are the most important risk factors for acute renal failure. Due to the fact that kidney failure is associated with psychological damage to the sufferer, as well as the inability to perform daily activities and disability, and imposes an interesting financial burden on the health care system, it is recommended for those with underlying diseases. These include high blood pressure, kidney stones, heart disease and diabetes. They go to medical centers every year for kidney tests.

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