Patient victim of polytrauma with acute renal failure in the intensive care unit

Pacientes vítimas de politrauma com insuficiência renal aguda na unidade de terapia intensiva

Pacientes víctimas de politrauma con insuficiência renal aguda en la unidad de cuidados intensivos

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ABSTRACT

Objective: To identify the characteristics of patients with acute renal failure (ARF), polytrauma victims hospitalized in an Intensive Care Unit (ICU). **Methods:** A retrospective analysis was performed on 357 records of patients with ARF in the period of 2002 to 2003. These patients presented a creatinine index of 1.8 to 4 mg/dl. Of these patients, 10.6% in the ICU were polytrauma victims. **Results:** Of the 38 (10.6%) patients with ARF and polytrauma victims, 78.9% of were males; 47.3% were aged between 16 and 45 years; 84.3% presented oliguria; 92.1% received no treatment for ARF during hospitalization; 50% remained from one to five days in the ICU; 47.3% had not presented any underlying disease and mortality occurred in 50%. **Conclusion:** Daily control of the renal function in polytrauma victims is important to prevent ARF complications and consequent mortality.

Keywords: Renal insufficiency, acute; Intensive care units; Multiple trauma

RESUMO

Objetivos: Identificar as características de pacientes portadores de insuficiência renal aguda (IRA), vítimas de politrauma, internados em uma unidade de terapia intensiva (UTI). **Métodos:** Foi realizada uma análise retrospectiva de 357 prontuários de portadores de IRA, no período de 2002 a 2003, com creatinina sérica de 1,8 a 4 mg/dl. Destes pacientes internados na UTI, 10,6% eram vítimas de politrauma. **Resultados:** Dos 38 (10,6%) pacientes portadores de IRA e vítimas de politrauma, 78,9% eram do sexo masculino; 47,3% tinham idade entre 16 e 45 anos; 84,3% apresentaram oligúria; 92,1% não receberam tratamento para IRA durante a internação; 50% permaneceram de um a cinco dias internados na UTI; 47,3% não apresentaram nenhuma doença de base e a mortalidade ocorreu em 50% desta amostra. **Conclusão:** Concluiu-se que a monitorização diária da função renal das vítimas de politrauma é um cuidado importante para evitar as complicações da IRA e a respectiva mortalidade.

Descritores: Insuficiência renal aguda; Unidades de terapia intensiva; Traumatismo múltiplo

RESUMEN

Objetivos: Identificar las características de pacientes portadores de insuficiencia renal aguda (IRA), víctimas de politrauma, internados en una unidad de cuidados intensivos (UCI). **Métodos:** Se llevó a cabo un análisis retrospectivo de 357 historias clínicas de portadores de IRA, en el período de 2002 a 2003, con creatinina sérica de 1,8 a 4 mg/dl. De estos pacientes internados en la UCI, el 10,6% eram víctimas de politrauma. **Resultados:** De los 38 (10,6%) pacientes portadores de IRA y víctimas de politrauma, el 78,9% eran del sexo masculino; el 47,3% tenían edades entre 16 y 45 años; el 84,3% presentaron oliguria; el 92,1% no recibieron tratamiento para IRA durante el internamiento; el 50% permanecieron de uno a cinco días internados en la UCI; el 47,3% no presentaron ninguna enfermedad de base y la mortalidad ocurrió en el 50% de esta muestra. **Conclusión:** el monitoreo diario de la función renal de las víctimas de politrauma es un cuidado importante para evitar las complicaciones de la IRA y la respectiva mortalidad.

Descriptores: Insuficiencia renal aguda; Unidades de Cuidados intensivos; Traumatismo múltiple

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INTRODUCTION

Acute Renal Failure (ARF) is a syndrome with several different causes, high rate of mortality (50%), long hospital stays and the necessity of expensive therapies[1-2].

The first four cases of victims who had ARF were described during the Second World War, 1941[3] ,after they had been exposed to bombings and died in one week . Bywaters's and Bell's early studies designed the experience with acute trauma and technical-scientific progressive evolution of ARF preventive care, thus recognizing the phenomenon "ARF and Acute Trauma"[4]. Nowadays, trauma is a big problem for public health, with distressing statistics and resulting in huge personal and social costs. Besides, it is one of the main causes of visits to emergency units[5].

The amount of traumas and ARF rate of morbidity have increased because of population growth and of technical-scientific development. Cardiovascular surgeries and organ transplant, along with intensive use of potentially nephrotoxic drugs, catastrophes, natural disasters and warlike conflicts, have determined high number of ARF patients[6]. ARF characteristics are: sudden renal failure, happening to serious patients who have medical backgrounds of shock or renal injuries. It may last for days or weeks, presenting frequent oliguria, high rate of mortality, potential for reversion. It also shows acute reduction of the renal function during variable periods, and kidneys do not perform their basic function of excretion and maintenance of organism hydroelectrolitic homeostasis. It happens because glomerular filtering decreases fast with reduced clearance of metabolism products and other substances, accumulating nitrogenous excretions such as urea and creatinine[6-8].

Such deterioration is defined from a previous basal parameter, which may be not the normal one, and renal function is defined by glomerular filtration, although other renal functions can be affected[9].

Polytrauma, exhausting physical exercises, metabolic disease, virosis, toxins, drugs and the use of statin can cause rhabdomyolysis, which, in turn, can cause ARF[3]. In general ARF is followed by oliguria (a person urinates 400 ml or less a day), anuria (a person urinates less than 100 ml a day) and sometimes by polyuria, with electrolytic disturbances and metabolic acidosis. Other signs and symptoms of ARF include: weakness, apathy, loss of appetite, nausea, vomiting, frequent and deep breathing (Kussmaul), lung edema, peripheral edema, ascites and coma, cardiac arrhythmia and severe muscle weakness (which can be consequences of metabolic disturbances, such as hyperkalemia and hypernatremia)[8-10]. Biochemically speaking, there is a serum increase of the concentrations of urea, creatinine (more than 1.8 mg/dl) and potassium (more than 6.5 mmol/L). Arterial gasometry shows metabolic acidosis and electrocardiograms can be useful to evaluate hyperkalemia[11-12].

That syndrome can be divided according to toxic and non-toxic causes; non-toxic causes are classified in pre-renal, renal and pos-renal[13-15].

Pre-renal ARF is a decrease of glomerular filtration due to renal hypoperfusion without intrinsic renal injury[12-13]. The causes are classified according to three types: hypovolemia caused by trauma, burns, any kind of hemorrhage, diarrhea and urinary loss, low cardiac output originated by cardiac failure, arrhythmia, pericardial tamponade, valvulopathy, pulmonary hypertension and mechanic ventilation with positive pressure, decreased renal effective blood flow because of sepsis, anaphylaxis, anesthesia, surgical aggression, hepatic failure or use of medicines[1-2-9] .

Post-renal ARF, or the obstruction of urine flow, is classified according to the anatomic level of obstruction: bilateral ureteral obstruction, divided in intra-ureteral (calculi, clots, residues of papilla or pus of renal pelvis), extra-ureteral (retroperitoneal fibrosis, ureter accidental ligation, infiltration of prostatic or vesical cancer), obstruction of vesical neck (neurogenic bladder), ureteral obstruction, ureteral valves or stenoses. In these cases, oliguria is the most frequent symptom; however, regular urinary volume is also possible[1-14].

Intrinsic renal disease is caused by intrinsic kidney factors; it may be considered after pre and post-renal causes have been disregarded. It is important to verify the patient's background for factors related to acute tubular necrosis, use of drugs, recent surgeries, physical traumas with muscular injury, hemolytic anemia background, pregnancy and procedures related to long-lasting renal hypoflow[2-7-8].

Between 2 and 5% of patients at hospitals have ARF; they are different patients who have had their clinical evolution worsened by factors such as: septic shock, hypovolemia, use of aminoglycosides, heart failure and radiocontrast. Patients with traumas, large burns, complicated surgeries, serious gyneco-obstetrics procedures, serious infectious diseases and acute intoxication have strong possibilities of developing ARF[2-6-16]; they can get sick during their hospital stays, or they can be already sick at the moment they arrive at the hospital[11]. Some of those patients stay in Intensive Therapy Units, and, according to their clinical condition, high death rates can be reached[16].

It is believed that differentiating ARF and acute renal failure and specifying if uremia is a consequence of curable factor as urine depletion, urinary obstruction or a result of pre-established clinic situation is very important[2-7]. It is also important to evaluate the patient's background in order to detect any previous disease, such as: diabetes, arterial hypertension, lupus, use of nephrotoxic drugs, and also to tell the difference between the acute and serious types[2-14-17].

Information about depletion, hydric ingestion and dehydration must be taken from hospital patients. Thus, anamnesis and a clinic situation studies are used for diagnosis[18-19].

Using diuretics in ARF treatment is an uncertain issue. Mannitol is frequently used a lot to revert ARF or to shorten its natural progress. In this case, the main medical focus is the patient's situation of hydration and electrolytic balance[1].

Hemodialysis is confirmed as the most well-known and usual treatment for ARF at Intensive Care Units (ICU)[2-17].

Death rates of ARF patients are high and their survival chance is very variable, despite technical-scientific advances to support ICU patients. It is necessary to be aware of renal protection measures in patients with high risk of developing ARF; some of the risk factors are: hypovolemia, septic shock, polytrauma, seriousness of diseases and the age of the patients. Polytrauma cases have systemic inflammatory responses[4-6-20].

A number of ARF cases could be avoided with preventive measures and medical care through a better analysis of the patient, avoiding the use of nephrotoxic drugs, and acting quickly at the first sign of complications[21].

The goal of this study is to characterize polytraumatized ARF patients at ITUs.

METHODS

A retrospective research was performed in order to characterize polytraumatized ARF patients in 2002 and 2003 at the General Intensive Therapy Unit of the Base Hospital in São José do Rio Preto, São Paulo. Data were provided by the Hospital Data Processing Center. 357 medical records on ARF patients were selected. Out of those 357 forms, 38 polytraumatized ARF ICU patient records were chosen, considering serum creatinine rates between 1.8 and 4 mg/dl for diagnosis. The Committee of Ethics in Research with Human Beings at the Medical School in São José do Rio Preto, São Paulo approved this study, and the data were collected with a specifically developed tool; data were classified with Excel for Windows 2003 software and analyzed through descriptive statistics.

RESULTS

Thirty-eight (10.6%) out of 357 patient control forms met the requirements to participate in this research, since they were patients with some kind of trauma. Thirty patients were men (78.9%); 18 (47.3%) patients were between 16 and 45 years old, 12 (31.5%) patients were between 61 and 80 years old and 8 (21.2%) patients were between 46 and 60 years old.

Nineteen (50%) patients stayed at the ICU from one to five days; 12 (31.6%) patients were there from six to fifteen days; and 7 (18.4%) patients were there for more than 15 days.

Thirty-two (84.3%) patients had oliguria and 6 (15.7%) patients had anuria. Most of the patients (92.1%) had pre-renal ARF. Twenty-eight (73.7%) patients had never been at the ICU of the Base Hospital and 10 (26.3%) had already been in that hospital's ICU .

Eighteen (47.3%) patients did not show any base disease; 10 (26.3%) patients had high blood pressure; 7 (18.4%) patients had diabetes mellitus; 5 (13.1%) patients had had a stroke; 3 (7.9%) patients had respiratory diseases; 2 (5.2%) patients had circulatory diseases and 1 (2.6%) patient had heart disease. Many times, those diseases were associated to the same patient.

Thirty-five (92.1%) patients did not have any kind of treatment for ARF while they were at the ICU and only 3 (7.9%) patients received some kind of intervention such as dopamine in renal doses.

Fifty percent of the patients died. Among the other patients, 8 (21%) patients survived after their first ICU stay. 11 (28.9%) patients did not have that information in their medical records.

DISCUSSION

It was possible to observe that 10.6% of the ARF patients at the ICU had some type of trauma. In research, complex post-surgery conditions, polytrauma, serious bleeding are reported as the most predisposing factors for ARF. In a study with 180 patients, 6.7% of the ARF cases had polytrauma as the main cause for developing that disease[22-24].

Some authors report that nearly 65% of the ARF patients at ITUs are men[25-26].

This study verified that 47.3% of the patients were between 16 and 45 years old, i.e., the productive age. Studies show that most trauma victims are within that age range, and the average age is 29.5 years old[27-28].

Most of the patients stayed at the hospital from one to five days, according to the profile of the trauma unit at the hospital in Porto Alegre, where polytrauma patients usually stay for fewer than seven days (71%)[27].

Polytrauma and respiratory diseases were the main causes for ARF patients to stay at the ITU. These data are in agreement with other investigations that have showed cranio-encephalic trauma (54%) followed by the need of hemodynamic and/or respiratory support (22%)[27].

As to hydric control, 84.3% of the patients presented oliguria. It corresponds to the data from the literature, which shows that oliguria is common (74%) in the clinical ARF presentation[28].

Pre-renal ARF was the most common kind of ARF (92.1%), but in literature this kind corresponds to 60 to 70% ARF causes[29]. It was possible to observe that 73.7% of the patients had never been at the ITU, and 47.3% had never had base diseases that can be related to their age range.

This study showed that most patients (92.1%) received no treatment for ARF while they were at ITU. This corresponds to the results of another study[20].

For many decades, low doses of dopamine (0.5 to 3 mg/kg/min) have been used as a therapeutic alternative to protect renal function in ARF patients at ITUs, even though there are no well-controlled studies about it[30]. Only 7.9% of the patients had any kind of intervention by using dopamine in renal doses. There is not enough literature about the use of dopamine in low doses as a therapeutic alternative to protect renal function in situations such as serious sepsis or septic shock[30].

Despite of advances of intensive therapy, the 50% mortality rate in this study was high, the literature shows that 22.2% of ARF patients' deaths correspond to polytraumatized surgical patients. Besides, it is possible that the increased use of well-defined strategies of first care to trauma patients, such as Advanced Trauma Life Support – ATLS - , has allowed a higher rate of initial survival, thus increasing the seriousness of the patients' diseases at the ITUs[25, 27].

CONCLUSION

Most polytraumatized ARF patients were men in productive age; they had been at the hospital for a long time and did not receive any kind of treatment for ARF while they were at the ITU.

Prevention for polytrauma causes and the daily monitoring of renal function of those patients are important measures, in order to avoid complications on the patients' conditions and death.

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