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ORIGINAL ARTICLE

Incidence of the acute renal failure in the intensive care unit at the General Hospital of Mexico: Risk factors and associated morbidity and mortality

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KEYWORDS
Acute renal failure;
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Abstract
Background: The acute renal failure (ARF) contributes to a longer hospital stay, morbidity, mortality and use of resources in critical patients.

The estimate of its incidence was difficult, mainly due to the lack of a generally accepted definition.

Objective: To determine the incidence, risk factors and effects of the ARF in critical patients.

Material and methods: Study of prospective cohort. Patients hospitalised in the Intensive Care Unit (ICU) were included. The population was divided into 4 groups: A: without ARF; B: with ARF at ICU admission; C: ARF developed at the ICU; and D: ARF at the admission, solved and developed again at the ICU. Descriptive and inferential statistics (Student's t, χ^2 and ANOVA).

Results: Of 360 patients, 50.5% were men. The mean age was 49 years. From the total, 145 (40.3%) did not develop ARF (group A). The main comorbidities were diabetes mellitus and high blood pressure. Patients with sepsis, shock and multiple organ failure showed a greater ARF frequency ($p < 0.001$). The ARF incidences were 30.3% in group B, 20.3% in group C and 9.2% in group D. The attributable mortality was 11.8%, 16.6% and 26.1%, respectively. There was a higher use of resources in groups C and D.

Conclusions: The ARF incidence in critical patients ranges from 9.2% to 30.3%. The main risk factors are sepsis, shock and MODS.

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PALABRAS CLAVE
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Factores de riesgo;
Incidencia

Incidencia de la lesión renal aguda en la unidad de cuidados intensivos del hospital general de México: factores de riesgo y morbi-mortalidad asociada

Resumen
Antecedentes: La lesión renal aguda (LRA) contribuye a mayor estancia hospitalaria, morbilidad, mortalidad y consumo de recursos en pacientes críticos.

Estimar su incidencia era complicado, principalmente por la falta de una definición generalmente aceptada.
Objetivo: Determinar incidencia, factores de riesgo y efectos de la LRA en pacientes críticos.
Material y métodos: Estudio de cohorte prospectiva. Se incluyeron pacientes hospitalizados en Unidad de Cuidados Intensivos (UCI). La población se dividió en 4 grupos: A. Sin LRA; B. con LRA al ingreso a UCI; C. LRA desarrollada en UCI; y, D. LRA al ingreso, resuelta y nuevamente desarrollada en UCI. Estadística descriptiva e inferencial (t de Student, χ^2 y ANOVA).
Resultados: De 360 pacientes, 50.5% fueron hombres. La edad media fue 49 años. Del total, 145 (40.3%) no desarrollaron LRA (grupo A). Las principales comorbilidades fueron diabetes mellitus e hipertensión arterial. Los pacientes con sepsis, choque y falla multiorgánica presentaron mayor frecuencia de LRA (p<0.001). Las incidencias de LRA fueron 30.3% en el grupo B, 20.3% en el grupo C y 9.2% en el grupo D. La mortalidad atribuible fue de 11.8%, 16.6% y 26.1%, respectivamente. Hubo mayor consumo de recursos en los grupos C y D.
Conclusiones: La incidencia de LRA en pacientes críticos oscila entre 9.2% y 30.3%. Los principales factores de riesgo son sepsis, choque y SDOM.

Introduction

Acute renal failure (ARF) is a frequent problem which significantly contributes to morbidity and mortality, particularly in critical patients. It is characterised by the sudden loss of the kidney capacity to excrete waste products, concentrate urine, preserve electrolytes and keep the water balance. It is particularly common in the intensive care unit (ICU), where it is associated to a 50–80% mortality.[1–4]

In Mexico, different studies have reported differing incidence and mortality rates because there was no accepted ARF definition.[5–9]

The aim of this study is to assess the incidence, risk factors, effects on the morbidity, mortality and use of resources in patients who were admitted to the intensive care unit (ICU) at the university general hospital in Mexico, using the updated definition of the group Acute Kidney Injury Network (AKIN).[4]

Material and methods

In this study of the prospective cohort, 18 year-old patients admitted to the ICU of the General Hospital in Mexico were included, from April 2013 to October 2014. Patients with chronic renal disease were excluded.

Demographic information (age, genre), clinical data (urine output per hour by kilogram and creatinine), presence of comorbidities (sepsis, shock, multiple organ dysfunction syndrome (MODS)) were collected. The Scale for the Assessment of Positive Symptoms (SAPS 3 (severity of the disease)), modified Brussels scale (organic failure) and Nine Equivalents nursing Manpower use Score (NEMS (use of resources)) were assessed.[10–12] The use of resources (invasive mechanical ventilation, continuous drug infusions, blood derivatives, length of stay in the ICU and hospital stay) were recorded.

The ARF was defined as the stage 1 of the AKIN classification, creatinine increase >0.3 mg/dL or 1.5–2 times increase in basal value, urine output <0.5 mL/Kg/h per six hours [4].

Sepsis was defined as the presence of infection together with systemic manifestations (temperature >38.3 °C or <36 °C, heart rate >90 heartbeats per minute, tachypnoea, leukocytes >12,000/μL or <4000/μL, systolic blood pressure <90 Torr). Severe sepsis such as low blood perfusion induced by sepsis or organic dysfunction (hyperlactataemia, PaO2/FiO2 <300, urine output <0.5 mL/Kg/h, creatinine >2 mg/dL, bilirrubine >2 mg/dL, platelets <100,000/μL).[13]

Multiple organ dysfunction syndrome (MODS) was defined as the progressive dysfunction of two or more physiological systems considered as the sum of 6 or more points in the modified Brussels scale.[11]

Patients were divided into four groups. Group A, patients who did not show ARF; group B, patients who already had ARF at the admission to the ICU; group C, patients who developed ARF during their stay at the ICU; and group D, patients who were admitted with ARF which was resolved during their stay and developed again in the same stay at the ICU. Descriptive statistics: Frequencies, proportions, arithmetical means, standard deviations and cumulative incidence of ARF. Inferential statistics: 2-way ANOVA (analysis of variance) test for the dimensional variables and χ^2 for non-parametric variables, considering a p value <0.05 significant. The statistical package used was the SPSS v. 13 (SPSS®, Chicago, IL, USA).