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ORIGINAL ARTICLE

Cardiorenal syndrome in acute heart failure: A vicious cycle?☆

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KEYWORDS
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Abstract
Introduction and Objective: Worsening renal function has an unquestionably negative impact on prognosis in patients with acute heart failure (HF). In Portugal there is little information about the importance of this entity in HF patients admitted to hospital. The objective of this work was to assess the prevalence of cardiorenal syndrome and to identify its key predictors and consequences in patients admitted for acute HF.
Methods: This was a retrospective study of 155 patients admitted for acute HF. Cardiorenal syndrome was defined as an increase in serum creatinine of ≥26.5 μmol/l. Clinical, laboratory and echocardiographic parameters were analyzed and compared. Mortality was assessed at 30 and 90 days.
Results: Cardiorenal syndrome occurred in 46 patients (29.7%), 5.4±4.4 days after admission; 66.7% (n=24) did not recover baseline creatinine levels. The factors associated with cardiorenal syndrome were older age, chronic renal failure, moderate to severe mitral regurgitation, higher admission blood urea nitrogen, creatinine and troponin I, and lower glomerular filtration rate. Patients who developed cardiorenal syndrome had longer hospital stay, were treated with higher daily doses of intravenous furosemide, and more often required inotropic support and renal replacement therapy. They had higher in-hospital and 30-day mortality, and multivariate analysis identified cardiorenal syndrome as an independent predictor of in-hospital mortality.
Conclusions: Renal dysfunction is common in acute HF patients, with a negative impact on prognosis, which highlights the importance of preventing kidney damage through the use of new therapeutic strategies and identification of novel biomarkers.

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PALAVRAS-CHAVE
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Síndrome cardiorrenal na insuficiência cardíaca aguda: um círculo vicioso?

Resumo
Introdução e objetivos: O valor prognóstico da deterioração da função renal é indiscutível nos doentes com insuficiência cardíaca aguda. No contexto nacional sabe-se pouco acerca do peso relativo da síndrome cardiorrenal no internamento destes doentes. Este trabalho pretende avaliar a prevalência, fatores preditores e consequências desta entidade em doentes internados por insuficiência cardíaca aguda.
Métodos: Análise retrospetiva de 155 doentes internados por insuficiência cardíaca aguda. Síndrome cardiorrenal definida como um aumento ≥ a 26,5 umol/L na creatinina sérica relativamente ao valor da admissão. Avaliados e comparados dados clínicos, analíticos e ecocardiográficos. Feito seguimento, referente a mortalidade, aos 30 e 90 dias.
Resultados: A síndrome cardiorrenal ocorreu em 46 (29,7%) doentes, 5,4±4,4 dias após a admissão; 66,7% (n=24) não recuperaram a função renal basal. Associaram-se ao desenvolvimento desta entidade: idades mais avançadas; antecedentes de insuficiência renal crónica; insuficiência mitral moderada/grave; níveis na admissão mais elevados de ureia, creatinina e troponina I; e mais baixos de taxa de filtração glomerular. Os doentes com síndrome cardiorrenal tiveram internamentos mais longos; necessitaram de doses diárias máximas de furosemida mais elevadas; mais frequentemente necessitaram de inotrópicos e de terapêutica de substituição renal. A sua mortalidade no internamento e aos 30 dias foi superior, sendo a síndrome cardiorrenal um fator preditor independente de mortalidade intra-hospitalar.
Conclusões: A disfunção renal é comum em doentes com insuficiência cardíaca aguda, com impacto claramente negativo no prognóstico, devendo a prevenção da lesão renal ser um objetivo primário passando por novas estratégias terapêuticas e identificação de novos biomarcadores.

Introduction

With a prevalence of over five million cases and almost a million hospital discharges a year, treatment of heart failure (HF) represents a growing therapeutic challenge to modern cardiology.[1]

Renal dysfunction in common in HF patients and is an independent prognostic factor, even in those with only minor alterations in renal function.[2–4]

Various retrospective studies and prospective registries have investigated the prognostic impact of renal dysfunction in acute HF.[5–8] In an analysis of the Acute Decompensated Heart Failure National Registry (ADHERE), only 9% of the 118 465 patients hospitalized for acute HF had normal renal function (defined as a glomerular filtration rate [GFR] of ≥90 ml/min/1.73 m^2),[7] and moderate to severe dysfunction is reported in 30–35% of cases.[3,5,9]

In 30–50% of cases, depending on the definition used, admissions for HF are accompanied by worsening renal function, which is associated with longer hospital stay, greater health care costs, and higher rates of in-hospital mortality, rehospitalization and mortality following discharge.[3,5,6,9]

Despite the solid evidence on the negative impact of worsening renal function during treatment of acute HF, the pathophysiology of cardiorenal syndrome (CRS) is not fully understood. Furthermore, the lack of an agreed definition has led to uncertainty concerning the diagnosis and treatment of this entity.[10]

It has been suggested that the definition of CRS needs to be refined, and a new etiological classification has been proposed that divides CRS into five subtypes in an attempt to promote a more consistent and logical approach.[11,12] Our study deals with type 1 (acute CRS), characterized by a rapid worsening of cardiac function leading to acute kidney injury.[12] The mechanisms by which acute HF causes a worsening of renal function are multiple and complex.[13] The causes of renal dysfunction during decongestive therapy can be broadly divided into three categories: pre-renal (HF with low cardiac output or hypotension); renal (atheroembolism or exposure to contrast agents, nephrotoxic drugs or diuretics); and post-renal (obstructive nephropathy or intra-abdominal hypertension).[14] The importance of each of these mechanisms will depend on the individual patient and clinical situation.

Patients with acute HF and renal dysfunction represent a particularly demanding challenge for clinicians.

The objective of this study was to assess the incidence of CRS (defined as an absolute increase in serum creatinine levels), the time it occurred, and its risk factors and prognostic impact, in consecutive patients hospitalized for acute HF. We also performed a detailed descriptive analysis of the evolution of renal function during hospitalization.

Methods

Population

We performed a retrospective analysis of 155 consecutive patients (50.3% male; mean age 74.1±10.7 years) admitted