



ORIGINAL ARTICLE

Acute kidney injury in acute coronary syndromes – An important multifactorial consequence



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Received 27 February 2016; accepted 28 April 2016

KEYWORDS

Acute coronary
syndrome;
Acute kidney injury;
Coronary
angiography;
Percutaneous
coronary
intervention;
Contrast media

Abstract

Introduction: Acute kidney injury (AKI) is a pathological phenomenon with a negative impact on outcomes in different clinical scenarios. Its mechanism in acute coronary syndrome (ACS) is not completely understood, and measures to prevent it are not uniform. We set out to study the incidence, clinical relevance, predictors and possible implications for patient management of AKI in ACS.

Methods: Using data from a multicenter national registry on ACS, we retrospectively analyzed predictors of AKI and its impact on outcomes (in-hospital complications and one-year mortality). All ACS types were included. AKI was defined as an increase in serum creatinine of ≥ 0.3 mg/dl (≥ 26.4 $\mu\text{mol/l}$) and/or by ≥ 1.5 times baseline.

Results: A total of 7808 ACS patients were included in the analysis, 1369 (17.5%) of whom developed AKI. AKI was shown to be an independent predictor of in-hospital major bleeding (odds ratio [OR] 2.09; 95% confidence interval [CI] 1.19–3.64; $p=0.01$), mortality (OR 4.72; 95% CI 2.94–7.56; $p<0.001$) and one-year mortality (hazard ratio 2.01; 95% CI 1.51–2.68; $p<0.001$). The incidence of AKI was associated with older age, history of hypertension, renal failure and stroke/transient ischemic attack, Killip class >1 on admission and left ventricular ejection fraction $<50\%$. Performance of coronary angiography or angioplasty were not associated with AKI. Diuretics during admission were predictors of AKI only in patients in Killip class 1.

Conclusions: AKI is an important finding in ACS, with a significant impact on hard clinical endpoints such as in-hospital and one-year mortality. It is associated with easily identifiable clinical factors and an invasive strategy does not increase its incidence.

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PALAVRAS-CHAVE

Síndrome coronária aguda;
Lesão renal aguda;
Coronariografia;
Angioplastia coronária;
Meios de contraste

Lesão renal aguda em síndromes coronárias agudas – uma consequência multifatorial**Resumo**

Introdução: A lesão renal aguda (LRA) é um fenómeno patológico que acontece em várias situações clínicas. A sua fisiopatologia no contexto de síndrome coronária aguda (SCA) não é completamente conhecida, pelo que as medidas de prevenção não são uniformes. Neste trabalho, estudamos a LRA em relação ao significado clínico, preditores e possíveis implicações para o tratamento no contexto de SCA.

Métodos: Utilizando dados de um registo nacional multicêntrico de SCA, analisámos, retrospectivamente, os preditores de LRA e o impacto na clínica através de complicações intra-hospitalares (IH) e mortalidade a um ano. A LRA foi definida como aumento de creatinina sérica de $\geq 0,3$ mg/dl e/ou 1,5 vezes o seu valor basal durante o internamento.

Resultados: Foram incluídos 7808 doentes com SCA na análise, 1369 (17,5%) dos quais desenvolveram LRA. A LRA revelou ser preditor independente de hemorragia *major* IH (*odds ratio* [OR] 2,09; intervalo de confiança 95% [IC] 1,19-3,64; $p=0,01$), mortalidade IH (OR 4,72; IC 2,94-7,56; $p<0,001$) e mortalidade a um ano (*hazards ratio* 2,01; IC 1,51-2,68; $p<0,001$). A incidência de LRA associa-se ao aumento da idade, hipertensão arterial, insuficiência renal e AVC/AIT, Killip-Kimball (KK) >1 na admissão e fração de ejeção ventricular esquerda $<50\%$. A realização de coronariografia ou angioplastia não se associaram a um aumento de LRA. A utilização de diuréticos foi preditora de LRA apenas em doentes KK 1.

Conclusões: A LRA é um achado importante no contexto de SCA, com impacto clínico significativo, nomeadamente mortalidade intra-hospitalar e a um ano. A LRA associa-se a características clínicas facilmente identificáveis e a estratégia invasiva não aumenta a sua incidência.

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Introduction

Acute kidney injury (AKI) is a pathological phenomenon that has changed in name and definition in recent years. The initial concepts of acute kidney failure and renal impairment were difficult to compare between studies, so there was a need to standardize a definition of what can be described as an “acute decline of kidney function as a consequence of a pathological insult”.

In 2004, the Acute Dialysis Quality Initiative group proposed the Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease (RIFLE) classification for acute renal failure,¹ which included serum creatinine (SCr) and/or urine output criteria to define three levels of renal dysfunction and two clinical outcomes.

In 2007, the Acute Kidney Injury Network group proposed the term ‘acute kidney injury’ and a new definition for the entire spectrum of acute renal failure, based on the previous RIFLE criteria.² It included three stages of AKI, also taking into account SCr and/or urine output.

The latest definition was published in 2012 by the Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group.³ It combines the previous definitions: AKI is present if SCr increases by ≥ 0.3 mg/dl (≥ 26.5 $\mu\text{mol/l}$) in 48 hours or by ≥ 1.5 times baseline within seven days, or if urine volume is <0.5 ml/kg per hour for six hours.

These criteria were largely derived from critically ill patients in intensive care units, with AKI of varying etiologies, and KDIGO appears to be a better predictor of in-hospital mortality than RIFLE.⁴ Understanding of AKI in acute coronary syndrome (ACS) is improving, but is still

limited. This study aimed to determine the incidence of AKI in ACS patients, to assess its impact on clinical outcomes, and to determine its predictors.

Methods**Study population and data management**

This was a retrospective study derived from the Portuguese Registry on Acute Coronary Syndromes (ProACS). Data are collected at a national level from all participating centers and entered into a dedicated web-based platform by the attending physician or other designated person at the time of discharge and at one-year follow-up. Information is recorded on demographics, clinical profile, clinical presentation, laboratory and imaging results, interventions, medication and in-hospital complications (reinfarction, congestive heart failure, shock, atrial fibrillation, mechanical complication, atrioventricular block, sustained ventricular tachycardia, cardiac arrest, stroke, major bleeding and death). Patients with all types of ACS, namely unstable angina, non-ST elevation myocardial infarction (NSTEMI) and ST-elevation myocardial infarction (STEMI), are included. Patients on dialysis are excluded. The period from October 1, 2010 to March 23, 2015 was analyzed, in which a total of 11 812 patients were included.

AKI was defined as an increase in SCr of ≥ 0.3 mg/dl (≥ 26.4 $\mu\text{mol/l}$) and/or by ≥ 1.5 times baseline during the admission period. Chronic renal failure was defined as serum creatinine >2.0 mg/dl prior to admission or a history of

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