

## Acute Renal Failure in Patients with Acute Myocardial Infarction Undergoing Primary PCI: an Alarming Combination

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In recent years, there has been enormous progress in our understanding of how renal function affects the outcomes of patients with coronary artery disease. Chronic renal insufficiency has emerged as one of the strongest risk factors for mortality in patients undergoing percutaneous coronary interventions (PCI)<sup>1,2</sup>. Furthermore, the development of acute renal insufficiency after cardiac catheterization and intervention is associated with markedly decreased survival and increased adverse events<sup>3</sup>.

Currently, there is widespread agreement that primary PCI performed in hospitals with adequate facilities is the most effective reperfusion strategy for patients presenting with acute myocardial infarction (AMI)<sup>4</sup>. However, the outcomes of these patients are still strongly related to several clinical characteristics. The study by Passos et al.<sup>5</sup>, published in this issue of the **Revista Brasileira de Cardiologia Invasiva**, focuses on the impact of renal function on the prognosis of patients undergoing primary PCI for AMI. Using data collected over 5 consecutive years, the authors analyzed the incidence, predictors and prognosis of patients developing acute renal failure after primary PCI. The study has triggered several reactions.

One of the most important findings of the study is the high incidence of acute renal failure in patients with AMI treated with primary PCI in a "real-life" setting. Specifically, approximately 15% of the study population developed acute renal failure. Plausible explanations include the high rates of baseline chronic renal insufficiency and diabetes mellitus, both known predictors of worsening renal function in patients exposed to contrast media. Importantly, when these 2 factors are combined, there is an additive influence on the develop-

ment of acute renal failure. Approximately every third patient in this study was diabetic and every tenth patient had baseline serum creatinine exceeding 1.5 mg/dl. Had creatinine clearance or glomerular filtration rate been used for the estimation of baseline renal function in this study, the percent of patients with renal insufficiency would have been even higher. Given the logistics of primary PCI in AMI patients, which preclude adequate preprocedural hydration – the only known reliable way to lessen renal damage related to contrast media exposure – every attempt should be made to minimize the volume of contrast used during the procedure.

Both an interesting and practically important observation of the present study is the finding that need for mechanical ventilation was, in fact, the most powerful independent predictor of acute renal failure. This helps us take a step forward in our understanding of the pathogenesis of acute renal failure in patients with AMI. Namely, this emphasizes that respiratory and/or hemodynamic instability is actually the most important mechanism of renal function deterioration in this patient group. Therefore, the challenge in these patients is to achieve a stable hemodynamic and respiratory state within the shortest time frame to minimize the risk of worsening renal function. Though not analyzed in the study by Passos et al.<sup>5</sup>, bleeding complications occur with increased frequency in high-risk populations, especially patients with renal insufficiency, causing or further aggravating the hemodynamic instability of these patients.

As expected, older age was a powerful independent predictor of acute renal failure. This makes intuitive

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Received on: 17/12/2008 • Accepted on: 18/12/2008

sense taking into account age-related changes in renal function including diminished glomerular filtration rate, tubular secretion and concentration ability. Also, elderly patients typically have more complex vascular and coronary anatomy, which results in larger contrast volume loads per case.

In agreement with previous studies, the analysis by Passos et al.<sup>5</sup> highlights the important correlation between the development of acute renal failure and long-term outcomes<sup>2,6</sup>. Specifically, almost one third of patients who developed in-hospital acute renal failure either died or experienced reinfarction. In addition, the finding of very high dialysis rates (5%) and relatively low event-free survival at a mean follow-up of 6 years in these patients is striking.

Despite notable advances in treating patients with AMI, there are still no reliable methods of protecting renal function in these patients. Given the enormous negative prognostic importance of acute renal failure, future investigations should assess new medications and devices able to prevent renal function and improve outcomes of patients with AMI.

## BIBLIOGRAPHIC REFERENCES

1. Best PJ, Lennon R, Ting HH, Bell MR, Rihal CS, Holmes DR, et al. The impact of renal insufficiency on clinical outcomes in patients undergoing percutaneous coronary interventions. *J Am Coll Cardiol.* 2002;39(7):1113-9.
2. Gruberg L, Dangas G, Mehran R, Mintz GS, Kent KM, Pichard AD, et al. Clinical outcome following percutaneous coronary interventions in patients with chronic renal failure. *Catheter Cardiovasc Interv.* 2002;55(1):66-72.
3. Dangas G, Iakovou I, Nikolsky E, Aymong ED, Mintz GS, Kipshidze NN, et al. Contrast-induced nephropathy after percutaneous coronary interventions in relation to chronic kidney disease and hemodynamic variables. *Am J Cardiol.* 2005; 95(1):13-9.
4. Keeley EC, Boura JA, Grines CL. Comparison of primary and facilitated percutaneous coronary interventions for ST-elevation myocardial infarction: quantitative review of randomised trials. *Lancet.* 2006;367(9510):579-88.
5. Passos RL, Siqueira DAA, Silva JFA, Sá FCF, Costa Junior JR, Feres F, et al. Insuficiência renal aguda após intervenção coronária percutânea primária no infarto agudo do miocárdio: preditores e evolução clínica a longo prazo. *Rev Bras Cardiol Invas.* 2008;16(4):422-8.
6. Sadeghi HM, Stone GW, Grines CL, Mehran R, Dixon SR, Lansky AJ, et al. Impact of renal insufficiency in patients undergoing primary angioplasty for acute myocardial infarction. *Circulation.* 2003;108(22):2769-75.