Abstract

Contrast-induced acute kidney injury in high risk patients undergoing invasive cardiac procedures

Introduction: Acute renal function impairment associated with radiologic procedures, known as contrast-induced acute kidney injury (CI-AKI), is strongly associated with a higher rate of morbidity, in-hospital mortality and diminished long-term survival. CI-AKI prevention focuses mainly on adequate periprocedural hydratation and use of a low amount of contrast media. Previous trials concerning use of adenosine antagonist theophylline revealed contradictory results.

Goals: Our interventional trial sought to evaluate the effect of theophylline in CI-AKI prevention in well hydrated elderly patients with chronic kidney disease. Our cross-sectional study focused on CI-AKI in patients undergoing primary PCI for ST segment elevation myocardial infarction (STEMI).

Methods: Interventional trial: randomized, double-blind, placebo-controlled trial was performed. 56 patients with estimated glomerular filtration rate bellow 60 60 ml/min/1.73m^2 referred for cardiac coronary angiography and/or angioplasty were enrolled. 31 of them were randomly assigned to 200 mg theophylline IV before procedure, and 25 to placebo. Iso-osmolar contrast Iodixanol was used. Trial protocol included mandatory parenteral hydration. The primary endpoint was serum creatinine level (SCr) 48 hours after coronary angiography and/or PCI and its change from baseline. The secondary end point was CI-AKI incidence defined as an increase in SCr of 25% or more or 44,2 μmol/l or more from the baseline value within the same time period.
Cross-sectional study included 203 consecutive patients who underwent primary PCI for STEMI during one year period.

Results: Baseline characteristics in placebo and theophylline groups of interventional trial were similar. There was no difference in serum creatinine neither at baseline (182 ± 52 μmol/l vs. 179 ± 40 μmol/l; p= 0,62) nor at study termination (182 ± 60 μmol/l vs. 186 ± 47; p=0,79). Absolute change in SCr 48 hours after coronary angiography and/or PCI did not differ between the two treatment arms (0,04 ± 19,45 μmol/l vs. 7,13 ± 26,76 μmol/l; p=0,267). CI-AKI occurred in 3 (5,4%) subjects. Although all of them were in theophylline arm, the difference was not statistically significant – 0 (0%) vs. 3 (9.7%); p= 0,11.
CI-AKI occurred in 25 (12,3%) patients of our cross-sectional study. Comparison of patients with CI-AKI development and without CI-AKI development follows. Patient with CI-AKI were older (69 ± 13 vs. 62 ± 12; p=0,05), included more women (48% vs. 27%; p=0,037), had lower mean ejection fraction (40 ± 12 vs. 49 ± 14; p= 0,0026), higher rate of Killip IV class heart failure (44% vs. 5%; p= < 0,0001), left main coronary artery as infarct related artery (12% vs. 0%; p=0,002) and need for intraaortic balloon counter pulsation (12% vs. 0,5%; p< 0,0001). Patients with CI-AKI had significantly higher in-hospital mortality, more frequent malignant ventricular arrhythmias and trend for higher incidence of other complications during hospitalization (atrial fibrillation, higher degree atrioventricular block, stroke, myocardial infarction mechanical complications and bleeding).

Conclusions: Prophylactic effect of adenosine antagonist theophylline on worsening renal functions in elderly patients with chronic kidney disease undergoing coronary angiography and/or PCI was not detected in our interventional trial. Our cross-sectional study revealed relatively high CI-AKI incidence in consecutive patients undergoing primary PCI for STEMI.