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Renal guard system in high-risk patients for contrast-induced acute kidney injury

Background: High urine flow rate (UFR) has been suggested as a target for effective prevention of contrast-induced acute kidney injury (CI-AKI). The Renal Guard therapy (saline infusion plus furosemide controlled by the Renal Guard system) facilitates the achievement of this target.

Methods: 400 consecutive patients with an estimated glomerular filtration rate ≤ 30 ml/min/1.73 m² and/or a high predicted risk (according to the Mehran score ≥ 11 and/or the Gurm score $>7\%$) treated by the Renal Guard therapy were analyzed. The primary endpoints were 1) the relationship between CI-AKI and UFR during pre, intra, and post-procedural phase of the Renal guard therapy, and 2) the rate of acute pulmonary edema and impairment in electrolytes balance.

Results: UFR was significantly lower in the patients with CI-AKI in the pre-procedural phase (208 ± 117 versus 283 ± 160 mL/h; $p < 0.001$) and in the intra-procedural phase (389 ± 198 versus 483 ± 225 mL/h; $p = 0.009$). The best threshold for CI-AKI prevention was a mean intra-procedural phase $UFR \geq 450$ mL/h (area-under-curve = 0.62; $p = 0.009$; sensitivity 80%; specificity 46%). Performance of percutaneous coronary intervention (hazard ratio [HR] = 4.13; 95% confidence intervals [CI] 1.81-9.10; $p < 0.001$), the intra-procedural phase $UFR < 450$ mL/h (HR = 2.27; 95% CI 1.05-2.01; $p = 0.012$) and total furosemide dose > 0.32 mg/kg (HR = 5.03; 95% CI 2.33-10.87; $p < 0.001$) were independent predictors of CI-AKI. Pulmonary edema occurred in 4 patients (1%). Potassium replacement was required in 16 (4%) patients. No patients developed severe hypomagnesemia, hyponatremia or hypernatremia.

Conclusions: Renal Guard therapy is safe and effective in reaching high UFR. Mean intra-procedural $UFR \geq 450$ mL/h should be the target for optimal CI-AKI prevention.

Biography

Carlo Briguori received his Bachelor's degree in Medicine and Surgery at the "Federico II" University School of Medicine in Naples in 1991. In 1995, he had his Board Certification in Cardiology at the "Federico II" University School of Medicine in Naples. In 2000 he had his PhD in Pathophysiology of Cardiovascular System at the University School of Modena (Italy). From 1999 to 2002 he was research fellow in Interventional Cardiology, at the Laboratory of Interventional Cardiology in San Raffaele Hospital in Milan, under the guidance of Antonio Colombo. Since 2002, he has been chief of the Laboratory of Interventional Cardiology at the Clinica Mediterranea in Naples, Italy. At present, he is a Consultant and co-Director of clinical research at the Laboratory of Interventional Cardiology, "Vita e Salute" University, San Raffaele Hospital, Milan (Italy). He is referee of some of the prestigious international journals in the field of cardiovascular disease. He is author and co-author of more than 150 studies published on some of the most prestigious international journals in the field of cardiovascular disease. The principal fields of interest are contrast agent associated nephro-toxicity, prevention peri-procedural complications during coronary angioplasty/stenting, percutaneous revascularization in patients with diabetes mellitus and therapeutic myocardial angiogenesis.

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