Protective Effect of Oral L-arginine Supplement in CKD Stage 3-4 Patients Receiving Contrast Media: A Double Blind Randomized Placebo Controlled Trial

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Background: Contrast-induced acute kidney injury (CI-AKI) is a common complication in hospitalized patients. Nitric oxide-signal transduction plays an important role in prevention of CI-AKI. L-Arginine is an amino acid involved in ammonia detoxification, and is well known as a precursor to nitric oxide, a key component of endothelial-derived relaxing factor.

Objective: To examine the efficacy of oral L-arginine for preventing CI-AKI in chronic kidney disease (CKD) patients and to evaluate risk factor of CI-AKI.

Methods: A randomized, double blind, placebo controlled trial was done in CKD stage 3-4 patients undergoing computer tomography. Eligible patients were randomly assigned into two groups: arginine 3 g in 6 gelatin capsules orally per day, and placebo 6 capsules as the same manner for 3 days before contrast media injection. Serum cystatin C, creatinine, electrolytes, estimated GFR, and urinary nitric oxide were measured at baseline and 48 hours after procedure.

Results: A total of 186 patients were randomized. Only 94 patients underwent computer tomography and completed protocol. 54 percent were male and 46 percent were female with mean age of 71 years. 39 patients in arginine group and 54 patients in placebo group were analyzed. No serious adverse event was detected in both groups. There were no significant differences between the arginine and placebo groups regarding baseline demographic and biochemical characteristics. The incidence of CI-AKI was 7.7% (3 patients) in the arginine group and 14.8% (8 patients) in the placebo (p = 0.29). In univariate analysis, arginine was a protective factor (OR = 0.48, p = 0.3) and risk factors for CI-AKI were diabetes mellitus (OR = 6.08, p = 0.012), smoking (OR = 6.3, p = 0.006), and Angiotensin converting enzyme inhibitors use (OR = 8.8, p = 0.039).

Conclusion: Oral L-arginine supplement before intravenous contrast media injection plus the standard hydration regimen tend to prevent CI-AKI in hospitalized patients with CKD stage 3-4, but not statistically significant. Therefore, further study to complete statistic analysis should be continued. However, this study confirms that Diabetes, ACEI, and smoking are strong risk factors for CI-AKI.

Keywords: Contrast-induced acute kidney injury, Arginine, Double blind randomized controlled trial, Phramongkutklao Hospital