

Role of N-Acetylcysteine in Prevention of Contrast-Induced Nephropathy after Cardiovascular Procedures: A Meta-Analysis

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Summary

Background: Contrast-induced nephropathy is one of the common causes of acute renal insufficiency after cardiovascular procedures.

Hypothesis: The objective of this paper was to analyze the published data on the usefulness of N-acetylcysteine in the prevention of contrast-induced nephropathy after these procedures.

Methods: Trials were selected if they were prospective, randomized, controlled, had selected patients with impaired renal function, used low-osmolality, nonionic contrast media intra-arterially, administered a total of four doses of N-acetylcysteine in addition to intravenous saline hydration, and had contrast-induced nephropathy as their primary outcome. Contrast-induced nephropathy was defined as an increase in serum creatinine concentration by >0.5 mg/dl or a 25% increase above baseline at or within 48 h post procedure. Meta-analysis was performed using the Fisher's Combined Test with a measure of effect size. The magnitude of the N-acetylcysteine effect was estimated using random-effects models. Homogeneity was evaluated using the chi-square test of homogeneity and standard Q statistic. Reporting bias was explored by the Rosenthal method.

Results: The Fisher's Combined Test was significant at $p < 0.005$ in favor of N-acetylcysteine. The size of the N-acetylcysteine effect was to reduce contrast-induced nephropathy by 20%. There was a 62% relative risk reduction in contrast-induced nephropathy with N-acetylcysteine using a fixed-effects model, and a 70% relative risk reduction using the random-effects model. In addition, we found that 27 unpublished trials showing no effects of N-acetylcysteine would exist to overturn the combined significance of $p < 0.005$ of the five trials in our meta-analysis.

Conclusion: Oral administration of N-acetylcysteine in addition to intravenous saline hydration has a beneficial effect in the prevention of contrast-induced nephropathy after cardiovascular procedures in patients with impaired renal function.

Key words: N-acetylcysteine, contrast induced nephropathy, radio contrast dyes, renal failure, coronary angiography, percutaneous coronary intervention, cardiac catheterization

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