Acetylcysteine prevented acute deterioration in renal function after coronary angiography in moderate renal insufficiency

Kay J, Chow WH, Chan TM, et al. **Acetylcysteine for prevention of acute deterioration of renal function following elective coronary angiography and intervention: a randomized controlled trial.** JAMA. 2003;289:553-8.

QUESTION

In patients with moderate chronic renal insufficiency having elective coronary angiography, is oral acetylcysteine safe and effective in preventing acute deterioration in renal function?

DESIGN

Randomized (unclear allocation concealment*), blinded (some study personnel, patients, and outcome assessors),* placebo-controlled trial with 7-day follow-up.

SETTING

University hospital in Hong Kong.

PATIENTS

200 patients (mean age 68 y, 61.5% men, 100% Chinese) with moderate chronic renal insufficiency (defined as creatinine clearance < 60 mL/min or serum creatinine level > 106 µmol/L) who were having elective coronary angiography with or without intervention. Exclusion criteria included dialysis, acute renal failure, change in use of diuretic or antihypertensive agent, and use of iodinated contrast media or nephrotoxic agent in the 30 days before study entry. Follow-up was 96%.

INTERVENTION

Patients were allocated to receive oral acetylcysteine, 600 mg twice daily (n = 102), or matching placebo (n = 98), given on the day before and the day of angiography, for a total treatment duration of 2 days. All patients received a nonionic, low-osmolality contrast agent (iopamidol).

MAIN OUTCOME MEASURES

Occurrence of acute contrast media (CM)–induced reduction in renal function (defined as > 25% increase in serum creatinine level within 48 h after receiving the low-osmolality contrast agent), change from baseline in mean serum creatinine level, length of hospitalization, and adverse events.

MAIN RESULTS

Analysis was by intention to treat. Fewer patients who received acetylcysteine than those who received placebo had an occurrence of acute CM–induced reduction in renal function (Table). At 48 hours, acetylcysteine was associated with a greater decrease from baseline in mean serum creatinine level than placebo (122.9 vs 107.8 µmol/L, P = 0.006). The acetylcysteine group had a shorter mean length of hospitalization than the placebo group (3.4 vs 3.9 d, P = 0.02). No major treatment-related adverse events occurred in either group.

CONCLUSION

In patients with moderate chronic renal insufficiency, oral acetylcysteine was safe and effective in preventing acute deterioration in renal function after elective coronary angiography.

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*See Glossary.

Acetylcysteine vs placebo in patients with moderate renal insufficiency having elective coronary angiography†

Outcome at 48 h	Acetylcysteine	Placebo	RRR (95% CI)	NNT (CI)
Acute contrast media–induced reduction in renal function	4%	12%	68% (9 to 89)	12 (6 to 117)

†Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

COMMENTARY

Prevention of CM-induced nephropathy is a major issue in patients with diabetes and chronic renal disease who are prone to cardiovascular complications and subsequent endovascular explorations and treatments. Since the 1990s, clinical studies on the protective effects of different CM (1, 2) or additional measures and drugs (3-6) resulted in recommendations for preventive hydration, reduced CM volume, and use of lower-osmolality CM. Based on the antioxidant properties and previous favorable results of N-acetylcysteine (NAC) in acute renal failure, its nephroprotective effects have been evaluated in 4 other studies of high-risk patients having computed tomography or angiocardiography. The results are mixed, with 2 positive (3, 4) and 2 negative (5, 6) studies. The study by Kay and colleagues reported positive results, included the largest number of patients with moderate renal insufficiency, showed a 3-fold decrease in acute renal deterioration, and showed a reduction in length of hospitalization. This benefit has the same magnitude as that of low-osmolality CM or preventive hydration, and is similar to the results of other positive studies of NAC. Conversely, no clear explanation exists for the discrepancies between studies. No major differences exist between positive and negative studies for baseline renal function and percentage of patients with diabetes, nature and volume of CM used, volume of preventive hydration, or NAC administration. Considering the simplicity and safety of preventive NAC, need for further explanations should not preclude its use in high-risk patients who have diabetes or chronic renal disease.

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