Central Venous Pressure-Guided Fluid Administration Prevencts Contrast-Induced Nephropathy

By Will Boggs MD
January 07, 2016

NEW YORK (Reuters Health) - Central venous pressure (CVP) monitoring allows safe and sufficient fluid administration to prevent contrast-induced nephropathy (CIN) in patients with chronic kidney disease and congestive heart failure, researchers from China report.

The incidence of CIN is more than 20% in patients with chronic kidney disease (CKD) complicated with congestive heart failure (CHF), and patients at significant risk for CIN should receive adequate hydration before and after receipt of contrast, the team notes in JACC: Cardiovascular Interventions, online December 9.

Dr. Geng Cian and colleagues from Chinese People's Liberation Army General Hospital in Beijing compared fluid administration with and without CVP monitoring for prevention of CIN in a randomized trial of 264 patients with CKD and CHF.

The CVP-guided group received significantly higher mean total volumes of saline (1,827 mL) than did the standard-hydration group (1,202 mL) and had a higher volume of urine output (1,461 mL vs. 805 mL).

The overall incidence of CIN was 22.7%, but it was significantly lower with CVP-guided hydration than with standard hydration (15.9% vs. 20.5%, p=0.006).

The proportions of patients with serum creatinine increases above 0.3 mg/dL and >50% from baseline were significantly lower in the CVP-guided group (19.7% and 3.7%, respectively) than in the control group (34.8% and 0.85%).

Patients with a left ventricular ejection fraction below 40% and those with the lowest CVP levels benefited most from CVP-guided hydration.

The rates of termination of hydration due to acute pulmonary edema were low and similar in both treatment groups.

Patients in the CVP-guided hydration group had significantly lower rates of myocardial infarction, renal replacement therapy, and cumulative major adverse events in the ensuing 90 days, compared with the control group.

As expected, patients who developed CIN had higher rates of major adverse events and all-cause mortality than those who did not develop CIN.

"CVP-guided fluid administration can safely and effectively reduce the risk of CIN in patients with CKD and CHF and substantially reduce composite major adverse events for these high-risk patients," the researchers conclude.

Dr. Richard Solomon from the University of Vermont College of Medicine in Burlington, who wrote an accompanying editorial, told Reuters Health by email, "The study didn't focus on mechanism, but it is intuitive that more fluid administered will generally result in more urine output and that has been shown to be protective in other studies."

He added, "The unique aspect of this trial is the inclusion of patients with CHF (LVEF <50%). This is a group where the risk of provoking heart failure with high-dose infusion rates is a much-feared adverse event. The study shows that using CVP monitoring allows more fluid to be administered without increasing the risk of provoking CHF."

"Certainly for patients with a high risk of developing acute kidney injury (those with history of CHF, chronic kidney disease, for example) using CVP or LVEDP to guide the amount of fluid to be administered seems appropriate," Dr. Solomon said.
"Fluid administration remains the cornerstone of protective therapy for patients undergoing cardiac angiography," Dr. Solomon concluded. "The more fluid administered, the lower the risk of acute kidney injury."

Neither Dr. Qian nor coauthor Dr. Yundai Chen responded to a request for comment.


J Am Coll Cardiol Intv 2015.