To the Editor: Acute renal injury after exposure to radiographic contrast media, contrast-induced nephropathy (CIN), accounts for a substantial proportion of all cases of acute renal failure (1). The incremental presence of predisposing factors including pre-existing chronic renal impairment, contrast load, diabetes, and advancing age contribute significantly to the risk of CIN, which may exceed 30% in the highest-risk patients (2). Due to common risk factors, patients undergoing coronary angiography or coronary intervention represent a particularly high-risk group. The development of CIN is a major source of clinical concern for several reasons. First, contrast-induced renal injury may in some cases contribute to a permanent worsening of renal function, in some cases requiring temporary or even permanent dialysis. Second, in patients undergoing coronary intervention, it is increasingly evident that the development of CIN is accompanied by higher periprocedural mortality, longer hospitalization, and a higher likelihood of complications (3).

Given the incidence of CIN and its clinical implications, there has been considerable interest in the development of strategies to reduce the risk of CIN. These include periprocedural hydration with saline or sodium bicarbonate, and treatment with N-acetylcysteine, although their effectiveness is controversial. Given the strong relationship between the volume of contrast media and CIN incidence, an alternate strategy is to limit the systemic contrast exposure. We therefore evaluated the possibility that renal contrast exposure could be limited by removing contrast-laden blood from the coronary sinus.
(CS) during and immediately after the intracoronary injection of contrast media.

We report here the initial experience with a system developed for the aspiration of contrast media from the CS during coronary angiography and intervention (CINCOR Contrast Removal System, Osprey Medical, St. Paul, Minnesota). The primary aim of the study was to evaluate the safety and efficacy of this approach, and secondarily we examined its ability to limit the decline in renal function after contrast exposure. A purpose-designed 11-F CS aspiration catheter and CS support device were placed via a 14-F right internal jugular vein sheath. The CS was successfully cannulated with the aspiration catheter in 31 of 41 patients. The mean time to cannulate the CS was 11.1 ± 9.3 min. There were no device-related serious adverse events. Our cohort included 26 patients with an estimated glomerular filtration rate (eGFR) of <60 ml/min that were evaluated for renal outcomes (5 pilot-phase patients had normal renal function). In this group, there was no change in eGFR from baseline to 72 h post-procedure (41.8 ± 2.2 ml/min to 41.1 ± 2.3 ml/min, p = 0.55) (Fig. 1). By comparison, a matched comparator cohort of 148 standard care patients (4) receiving a similar contrast load experienced a significant decrease in the eGFR from 42.7 ± 0.8 ml/min to 40.1 ± 0.9 ml/min (p < 0.001) at 48 h. There was a greater net decrease in the eGFR in the comparator group: −2.5 ± 0.5 ml/min versus −0.7 ± 1.2 ml/min, p < 0.05. The average amount of blood collected by CS aspiration was 169 ± 15 ml per patient, and this resulted in a clinically small but statistically significant decrease in hemoglobin from 12.3 ± 0.2 g/dl to 11.7 ± 0.2 g/dl (p < 0.01).

In 65 standard care patients with a baseline eGFR <40 ml/min, the eGFR fell from 33.1 ± 0.7 ml/min to 31.7 ± 0.8 ml/min (p = 0.003), whereas in those with concomitant CS aspiration and an eGFR <40 ml/min (n = 11), there was no change in the eGFR (30.7 ± 1.6 ml/min to 31.4 ± 1.8 ml/min, p = 0.42). The between-group difference in the eGFR response was −1.5 ± 0.5 ml/min versus +0.5 ± 0.7 ml/min (p < 0.05). In patients undergoing CS aspiration, we quantified the extent of radiographic contrast capture. Unlike other experimental studies of CS capture, we directly measured the concentration of iodine in the collected material using inductively coupled plasma-optical emission spectroscopy. CS contrast aspiration resulted in the recapture of 32 ± 3% of the delivered contrast, ranging from 6% to 64%.

Taken together, the present study provides supportive evidence of the safety and feasibility of a CS-based aspiration system for the removal of radiographic contrast in patients undergoing coronary angiography and intervention. Our data also provide a preliminary indication that the collection of contrast from the CS reduces systemic exposure and, in conjunction, attenuates expected nephrotoxicity. These data warrant further evaluation in a large-scale randomized trial to evaluate the capability of CS contrast capture to reduce the risk of contrast-induced nephropathy and its complications.

Stephen J. Duffy, MD, PhD
Peter Ruygrok, MD
Craig P. Juergens, MD
Horst Sievert, MD
Mark Richards, MD
James Blake, MD
Robert Whitbourn, MD
H. Omar Farouque, MD, PhD
Terence Pertile, PhD
*David M. Kaye, MD, PhD

*Heart Failure Research Group
Baker IDI Heart and Diabetes Institute
P.O. Box 6492
St Kilda Road Central
Melbourne, Victoria 8008
Australia
E-mail david.kaye@baker.edu.au

doi:10.1016/j.jacc.2010.01.065

Please note: Dr. Sievert has received study honoraria, travel expenses, and/or consulting fees from Access Closure, AGA, Angiomed, Ardian, Arterix, Avirger, Bridgepoint, CardioKinetics, CardioMEMS, Coherex, CSI, EndoCross, EndoTex, Epitek, Evalve, ev3, FlowCardia, Gore, Guidant, Lumen Biochemical, Kensey Nash, Kyoto Medical, Lutonix, Medinol, Medtronic, NCD, NMT, OAS, Occlutech, Osprey, Ovalis, Pathway, PendraCare, Percardia, pfm, Remon, Rox Medical, Sadra, Sorin, Spectranetics, SquareOne, Viacor, and Velocimed; and has stock options in CardioKinetics, Access Closure, Velocimed, CoAptus, Lumen Biomedical, and Coherex. Dr. Pertile is an employee and stockholder of Osprey Medical. Dr. Kaye is a founder and stockholder of Osprey Medical.

REFERENCES

Letters to the Editor
Distinct Patterns of Autoantibodies Against G-Protein–Coupled Receptors in Chagas’ Cardiomyopathy and Megacolon
Their Potential Impact for Early Risk Assessment in Asymptomatic Chagas’ Patients

We demonstrated in the Journal (1) that patients with Chagas’ disease suffering from cardiomyopathy and megacolon show positivity of autoantibodies directed to the beta2-adrenoreceptor (AAB), beta2-AAB, and muscarinergic3-receptor (M3-AAB). A subset of nearly 35% of asymptomatic Chagas’ patients also presented with AAB patterns indicative of either cardiomyopathy (beta2-AAB and M3-AAB) or megacolon (beta2-AAB and M3-AAB). Because the numbers of AAB positive but asymptomatic subjects paralleled the epidemiological data for the percentage of