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Commentary: Using the right tools for the job: Revisiting renal preservation during open thoracoabdominal aortic aneurysm repair

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CENTRAL MESSAGE

Renal injury during surgical thoracoabdominal aortic aneurysm repair is associated with morbidity and mortality. Organ-preservation solutions may offer better protection than traditional crystalloids.

Surgical repair of thoracoabdominal aortic aneurysms (TAAAs) is one of the most complex and high-risk procedures performed today. Despite contemporary techniques in cardiovascular surgery, up to 30% of elective patients suffer serious complications, including death, stroke, paraplegia, and dialysis-dependent renal failure.¹ In particular, surgical replacement of the juxtarenal aorta necessitates a period of renal ischemia and results in approximately 10% of these patients requiring postoperative renal-replacement therapy (RRT).^{2,3} Furthermore, recent reports have shown that postoperative acute kidney injury (AKI) is difficult to predict and even mild forms can result in significant morbidity and mortality.⁴ In response to this challenge, several efforts have been made to identify the optimal strategy for perioperative renal protection during surgical TAAA repair.⁵

In this issue of the *Journal*, Kahlberg and colleagues⁶ report the findings of the CURITIBA trial, a single-center, randomized, controlled trial comparing renal perfusion with cold enriched Ringer's lactate with Custodiol solution (Essential Pharmaceuticals, Durham, NC) during surgical TAAA repair. Custodiol is an organ-preservation solution first developed for cardiac transplantation but has since

been used for hepatic, renal, and pancreatic transplantations.⁷ A total of 90 elective patients were included in this study. The primary outcome was the incidence of AKI, as defined using the Kidney Disease: Improving Global Outcomes guidelines and assessed using the greatest measured postoperative creatinine.⁸ Secondary analysis examined the severity of AKI, need for RRT, and mortality up to 1 year. A multivariate analysis was also performed to identify risk factors associated with the development of AKI.

The major finding of this study is exciting. The incidence of AKI was significantly lower in the Custodiol group, occurring in 22 patients (49%) compared with 34 patients (75%) in the enriched Ringer's lactate group. In addition, there was a trend toward lower rates of severe AKI and need for temporary RRT in the Custodiol group, although these differences were not statistically significant. In the multivariate analysis, only the use of Custodiol was found to be protective from postoperative AKI. No significant differences were observed in rates of mortality at 30 days and 1 year.

The renal protective benefits of Custodiol solution in open TAAA surgery are important. Intermittent cold crystalloid perfusion with lactated Ringers is currently the most common approach to renal protection during surgical TAAA repair.⁹ It has previously been found to be superior to

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continuous isothermic blood perfusion and equivalent to intermittent cold blood perfusion.¹⁰ However, specialized organ-preservation solutions have not been studied in this context in a randomized controlled trial.¹¹ These organ-preservation solutions contain additional additives to reduce cellular swelling and decrease ischemic renal tubular injury.¹² The evidence provided here certainly highlights the potential role of these solutions for renal preservation during surgical TAAA repair. However, this enthusiasm may be tempered by the high overall incidence of AKI reported in this study (62%), indicating that some element of renal dysfunction occurs in the majority of open TAAA cases despite the use of renal-protective strategies. Furthermore, this study was small and was not powered to assess differences in morbidity or mortality beyond AKI. Future external validation of these findings in larger, multicentered trials will be important to facilitate adoption of this strategy for renal protection during surgical TAAA repair.

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