Acute kidney injury after cardiac surgery is not always related to coronary angiography timing

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Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication March 9, 2016; accepted for publication March 10, 2016; available ahead of print April 20, 2016.

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J Thorac Cardiovasc Surg 2016;152:262-3

0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2016.03.043>

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Central Message

The timing of coronary angiography for developing AKI only affected patients whom underwent for CPB cardiac surgery.

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Before deciding to refer a patient for coronary artery bypass graft surgery (CABG), we logically consider the balance between advantages and disadvantages and between benefits and risks, especially if cardiopulmonary bypass (CPB) is needed. One of the most serious complications for patients who undergo CABG is acute kidney injury (AKI). Its incidence is up to 30%, depending on the diagnostic criteria used.^{1,2} Several settings are suggested as favoring the occurrence of AKI, such as the one reported by Kim and colleagues³ in this issue of the *Journal*. In agreement with previously published studies,^{4,5} both the timing of coronary angiography and the use of on-pump CPB favors the appearance of AKI. Thus, as Kim and colleagues³ report, these 2 factors are associated with increased short-term morbidity and mortality.

Surely, there is no single mechanism for the development of AKI after CABG.^{3,6} Rather, AKI results from the interaction of various factors, including age, diabetes, poor cardiac function, preoperative renal dysfunction, anemia, and contraction of renal blood vessels.⁷⁻⁹ Moreover, the underlying mechanism for explaining the development of AKI after CABG may be related to the cytotoxic effects of contrast administration, ischemia-mediated oxidative stress, cytotoxic effects from on-pump circulation, and other factors.^{10,11} Several factors that have been previously reported as independently associated with an increased risk of postoperative AKI in patients who underwent CABG can be managed. One of these is the decision for using CPB. Currently, the rate of CPB surgery is much lower than in past years, thus favoring the successful increase in results and outcomes.⁵

In this article, authors report data from a retrospective review of 2371 consecutive patients who underwent cardiac surgery at their institution over the study period. The authors had previously published in this area, and their work represents one of the largest experiences in evaluating severe AKI and outcomes in cardiac surgery patients.

Postoperative AKI was defined by authors according to the consensus Kidney Disease: Improving Global Outcomes Definition and Staging (KDIGO) criteria¹² using the maximal change in serum creatinine (sCr) during the first 7 postoperative days, compared with the preoperative baseline values. AKI was also defined by either an increase in sCr ≥ 0.3 mg/dL within 48 hours or an increase in sCr ≥ 1.5 times baseline.

Kim and colleagues³ report 2 important findings. First, to our knowledge, this is the first time that a comparison of the timing of coronary angiography and the timing of CABG confirmed that the risk of AKI after CABG is influenced by the interval between coronary angiography and the operation; thus, this timing may have clinical implications. Second, the authors found a different relationship regarding the incidence of AKI and the need for CPB. They did not report a relationship between the timing of coronary angiography and off-pump CABG with AKI, in contrast with previous publications.¹³⁻¹⁵

This study has some limitations, however, and some questions require a deeper explanation. First, this was a retrospective single-center study, with the well-known limitations of these studies. Second, the authors do not report the indication for surgery and thus the need for CPB; several factors along with concomitant valve surgery could be involved in the development of renal dysfunction (eg, cross-clamp time, oxidative stress). Third, in agreement with a previous point, they did not explain the underlying mechanism for renal damage differences between the need or not of CPB; thus, controlling modifiable risk factors can reduce the occurrence of AKI. Fourth, why did they decide to use 7 days as cutoff and not, for example, a

5-day cutoff? The cutoff of 7 days seems rather arbitrary despite the authors' previous publications and their explanation in their supplementary methods section.

In summary, the authors have shown that the timing of coronary angiography for developing AKI affected patients who receive CPB during cardiac surgery, but did not affect the development of postoperative AKI, at least in patients in whom CPB was not used. Future controlled studies are needed.

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