Coronary computed tomography angiography: Star of the show or supporting act?

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Central Message

Coronary computed tomography angiography seems to be an attractive substitute for angiography in the preoperative assessment of patients undergoing valve surgery. But is it really a valid alternative?

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Coronary angiography (CAG) is currently recommended as the gold standard for identifying coronary artery disease (CAD) in patients undergoing heart valves surgery.^{1,2} However, despite its wide use, it is not free of complications as the result of its invasive nature.³ Therefore, there remains a need for a valid alternative diagnostic tool. Over the last 10 years, several papers have been published that evaluate the reliability of coronary computed tomography angiography (CCTA) as a possible substitute. Moreover, a recently published meta-analysis⁴ demonstrated that CCTA can be very effective both in terms of sensitivity (93%) and specificity (89%). It is important to point that regardless of the value of the real impact of meta-analyses on clinical research,⁵ it has to be highlighted that this review involved only 1107 subjects and was affected by a certain degree of heterogeneity, especially in the presence of aortic valve stenosis.

Lee and colleagues⁶ in this issue of the *Journal*, in a nicely designed and well-conducted propensity score study to evaluate the clinical impact of CCTA in preoperative diagnosis of CAD in patients undergoing heart valve disease, found conflicting results. The authors have, in fact, showed a reduction in detection rates of CAD with CCTA. In the overall cohort, the authors saw a confirmation of CAD in 4.9% of the patients in the CCTA group compared with 9.7% in the CAG group ($P < .001$), which was persistent after matching (6.6% vs 11.2%; $P = .007$). Most importantly, there were 94 patients who underwent CAG although CCTA did not show a significant stenosis: in this subgroup, more than 10% of the patients were found to have significant stenosis at CAG, demonstrating the reduced sensitivity of CCTA in detecting CAD. In contrast, in the group of patients with significant disease at CCTA, only 56% were confirmed at CAG, thus showing also a small specificity of the CCTA. These differences were also reflected with the small number of coronary artery bypass grafts done in the CCTA group.

The study has also the benefit of evaluating clinical outcomes, demonstrating a significantly greater incidence of low cardiac output in the patients in the CCTA group

but no differences in terms of 30-day mortality, postoperative stroke, and acute kidney injury rates. As shown in Table E3, most of the low cardiac output syndromes were related to perioperative myocardial infarction and, although it is not easy to discriminate the causative nature of these postoperative myocardial infarction, it can be speculated their possible relationship with undiagnosed coronary diseases. Furthermore, it is important to note the presence of a greater number of major adverse cardiac events in the CCTA group (although not statistically significant), which could be correlated with a reduced diagnosis of CAD.

Another important finding of this paper is the increased risk of developing acute kidney injury after surgery when CAG followed CCTA (which can be contrast related). In this sense, it would be better to consider CAG as the primary diagnostic tool, rather than delay the diagnosis and expose the patient to further risks. The study has some limitations, mainly related to its nonrandomized nature (partially addressed with the propensity score matching), but also to the lack of a systematic and predefined pathway of diagnostic assessment where some patients underwent both tests without clear definition of their disease. Despite these important limitations, it provides a good understanding of clinical impact of CCTA in a large cohort of patients and is probably the largest study of this type.

Overall, the real advantages of CCTA in identifying coronary disease are still to be demonstrated and until such time

arrives, CAG remains the most reliable instrument to detect CAD before valve surgery. A prospective, randomized controlled trial would be the ideal way to address this topic. The technological improvements in the last few years have for sure increased the possible future role for CCTA to define CAD in such cohort of patients, but in our opinion, its large-scale use in this setting appears to be less efficient and still far from being a mainstream practice.

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