Is Coronary Arteriography a Diagnostic Test?

Several documents released recently have rekindled my interest in asking the question: is coronary arteriography a diagnostic test? In a previous editor’s page communication, I made an attempt to defend the diagnostic angiogram (1). I pointed out the value of the information in addition to noninvasive risk stratification, and I emphasized the fact that true freedom of choice for the caring physician and the patient could only be achieved once the coronary anatomy is known. For the past 5 or more years, I have been a participant in the formation of the new guideline for the diagnosis and management of patients with stable ischemic heart disease. This intersocietal document provides valuable guidelines for the evaluation and management of patients with stable ischemic heart disease with in-depth investigation of risk assessment based on imaging modalities (2). The document differs from earlier guidelines dealing with the subject in that the coronary anatomy is not considered as part of the baseline information. In this document, although the coronary arteriogram is frequently referred to as the gold standard for assessing other imaging modalities, it is not, itself, considered as one of those. The algorithms presented direct a decision for coronary arteriography to arise from the noninvasive imaging indicating a high likelihood of severe ischemic heart disease, or when symptoms are unacceptable despite guideline directed medical therapy. In addition, coronary arteriography is considered appropriate in survivors of cardiac arrest and when noninvasive testing is inconclusive, contraindicated, or inadequate. So, one can conceive, in this hierarchical decision-making recommendation, that coronary arteriography is considered a preamble to revascularization rather than a diagnostic imaging modality.

I want to be clear that, as an author of this document, I find it valuable, but there will be concern among interventional colleagues that undue restriction on coronary arteriography has been imposed. How has coronary arteriography become relegated to a secondary or tertiary position in the work-up of patients with stable ischemic heart disease? The answer, I believe, comes from two directions. First, noninvasive imaging has become much more sophisticated and, if applied at the highest level, would identify most of the patients at increased risk. Clearly the presence of ischemia, identifiable by several noninvasive means, is a potent predictor of risk, as well as an identifier of opportunity for improvement with revascularization strategies. The second reason is the practice of ad hoc percutaneous coronary intervention (PCI). The recent consensus statement from the Society for Cardiac Angiography and Interventions, “Ad Hoc Percutaneous Coronary Intervention” (3), recognizes the widespread use of ad hoc PCI and, although providing the caution, “ad hoc PCI for stable ischemic heart disease requires pre-procedural planning, and reassessment after diagnostic angiography must be performed to insure its appropriateness,” it goes on to provide the 2 major rationales: “Patients may prefer ad hoc PCI because it is convenient” and “Payers may prefer ad hoc PCI because it is cost efficient.” Patient convenience and payer cost reduction seemed to have carried the day since the vast majority of PCIs are now performed ad hoc.

There are a couple of other communications recently crossing our desks which may further confound the issue. The appropriate use criteria have identified numerous scenarios for revascularization classified as appropriate, uncertain, or inappropriate. Many of these entail knowledge of the coronary anatomy and, therefore, coronary arteriography is a prerequisite for classifying those indications. There seems to be wide disparity in adherence to these appropriateness criteria. In New York State, the range of “inappropriate” revascularization was 3% to 40% suggesting that, in addition to practice patterns, there may be documentation issues that will have to become standardized in order to...
have a clearer understanding of how compliant hospitals are becoming (4). The avoidance of inappropriate revascularization is not the only revelation that was pointed out using the appropriate use criteria document. A study from Ontario, Canada showed that patients deemed appropriate for revascularization who underwent revascularization had a 39% reduction in the composite of death or recurrent acute coronary syndromes at 3 years compared to patients who did not undergo revascularization (4). In this appropriate category, patients who did not undergo revascularization also had a mortality rate that was more than double that of patients who did undergo revascularization. Therefore, failing to treat these patients with coronary revascularization increased their risk and, even for patients who were judged to have uncertain appropriateness, there was a trend in favor of better outcomes with revascularization. The guidelines, which are based on evidence as much as possible, clearly influence the votes on the appropriate use criteria, and these will surely influence the decision making for patients with stable ischemic heart disease. The new guidelines make recommendations for therapy to mitigate risk but also recommendations for the evaluation of symptoms. The recommendation to perform catheterization in patients with ongoing symptoms despite guideline-directed medical therapy importantly includes the consideration of patient preference. Space limitations prevent further discussion of the guidelines but I encourage you to read the document.

Perhaps in the future diagnostic coronary arteriography may not be necessary because some form of computed tomography angiography or other noninvasive method may obviate the need for invasive catheterization. On the other hand, if we look at the realities of today as reflected by the recent report from the Cath PCI Registry of the National Cardiovascular Data Registry (5), we see that in 2010 and 2011 among NCDR participating hospitals there were 1,110,150 diagnostic catheterizations only cases and 941,248 percutaneous interventions. About half of the patients with diagnostic catheterizations had a stress test performed; however, of those, only 1.7% underwent coronary computed tomography angiography. The diagnostic use of the coronary arteriogram is illustrated by the fact that, of more than a million patients undergoing diagnostic arteriography only, one-half either had no coronary disease or nonobstructive coronary disease. Certainly for other imaging modalities, a negative test is not equated with an inappropriate indication for the procedure. Invasive imaging is viewed by some as carrying a greater risk than noninvasive imaging, but among more than a million diagnostic catheterizations, I noticed that the fluoroscopy time, <5 min on average, and the contrast volume is just over 100 cc’s. Any bleeding within 72 h was reported in one-half of 1% of patients undergoing diagnostic catheterization without STEMI. Virtually all diagnostic catheterizations can be performed as outpatient procedures.

Finally, my view is that the coronary arteriogram is a diagnostic test of value in many situations. The most pertinent, key messages regarding revascularization in the new guideline are, “prior to revascularization to improve symptoms, coronary anatomy should be correlated with functional studies to ensure lesions responsible for symptoms are targeted,” and the new emphasis that the degree of ischemia is a very potent predictor of cardiac risk. When risk is high, coronary revascularization is warranted. When symptoms persist, revascularization is warranted. And, if revascularization is to be considered for any patient, coronary arteriography is a requirement. Although noninvasive means may someday supplant the coronary arteriogram as the gold standard for defining the structural condition of the coronary arteries, for the foreseeable future the appropriate use of coronary arteriography as a diagnostic test should remain.

Address correspondence to:
Spencer B. King, III, MD, MACC
Saint Joseph’s Heart and Vascular Institute
5665 Peachtree Dunwoody Road NE
Atlanta, Georgia 30342
spencer.king@emoryhealthcare.org

REFERENCES