INVASIVE THOUGHTS

Functional Coronary Revascularization: An Idea Whose Time Has Arrived
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The decision to perform coronary revascularization is correctly based on a combination of factors, including the presence and severity of symptoms, objective evidence of ischemia, the volume of myocardium at jeopardy, the presence of viable myocardium with the potential for reversible dysfunction, and demonstration of significant coronary stenoses that are treatable with current techniques. Adding a physiologic measure of stenosis severity to anatomic assessment enhances the accuracy of diagnosis and optimizes the selection of patients for expensive and risky treatment options. The current generations of the PCI Guidelines and the Revascularization Appropriateness Criteria accurately advise the consideration of these factors in reaching a decision regarding invasive and interventional procedures. However, their next versions should amend the current dependence on nuclear scans and the size of a defect as the standard for assessing the significance of a stenosis. In contemporary intervention, the use of fractional flow reserve (FFR) in ambiguous scenarios should be regarded as best practice.

Our failure to resolve the uncertainty that attends the subjective interpretation of angiograms impacts the selection of patients for interventional procedures. Although coronary angiography is no longer considered the “gold standard” and is recognized as imprecise, especially with a stenosis in the intermediate range, it remains the primary diagnostic tool. Neither quantitative angiography nor improved resolution obviates the inherent inaccuracies of anatomic assessment. Intravascular ultrasound may enhance anatomic characterization, but it too is imperfect.

An adjunctive method to confirm physiologic significance has been sought for several decades. Nuclear and echocardiographic stress tests are not quantitative methods, and may be inaccurate in specific circumstances: for example, multivessel disease, prior infarction, and when target level of physiologic stress is not achieved. These tests should not be used as the final arbiter for appraising either the volume of myocardium at jeopardy or the significance of a stenosis, especially in complex settings. The specificity of imaging-based stress testing (65%-75%) is too low to be considered definitive. Although COURAGE found a relationship between survival and the size and number of thallium defects in a post hoc study, mandating the size of a defect as the measure of appropriateness of a revascularization procedure is in conflict with the data interpretation and has little basis in actual practice. The angiographic demonstration of a 90% proximal stenosis in a dominant RCA is a more accurate assessment of myocardial jeopardy than a “small” inferior defect.

FFR is a functional test that incorporates physiology and functionality, correlating with stress test results and prognosis. Measuring FFR optimizes the benefit of PCI and distinguishes stenoses responsible for ischemia from functionally insignificant ones.

Improves clinical outcomes and saves resources compared with PCI guided by angiography alone. FFR is especially useful when non-invasive testing is absent, equivocal, or does not provide objective evidence of ischemia in the myocardial segment subtended by the targeted lesion. In the presence of angiographically intermediate stenoses, or when there is an apparent discordance between lesion severity or the location of ischemia and non-invasive testing, FFR provides valuable data for clinical decision-making.

“Functional angioplasty” (performing PCI on lesions responsible for ischemia and treating medically those that are not), as opposed to complete anatomic revascularization (performing PCI on all lesions that appear angiographically significant), is an idea whose time has come. Functional PCI using FFR ought to be the single measure of PCI appropriateness when there is any uncertainty as to significance of a stenosis. Instead of relying solely on angiographic criteria of severity when there is no stress test present, or when the stress test/anatomic results are discordant, FFR should be the final authority. These conclusions also have implications for determining the optimal treatment strategy in patients with multivessel CAD. By measuring FFR and disregarding non-ischemic lesions, the Functional SYNTAX score can be calculated and angiographic 3-vessel CAD reclassified as 1- or 2-vessel CAD, which could benefit from PCI and not require CABG.

Reimbursement for revascularization will soon be dependent on its appropriateness, which is linked to the results of these tests. The current PCI appropriate-use criteria are matrix-based, which sets a few variables as critically important and not modifiable by other factors known to be influential in actual practice, such as age, patient preference, and desire to improve quality of life. This was acceptable when these AUC were the basis of quality assessment in which a particular case was less critical than an operator or a laboratory performing within 2 standard deviations of the mean. That would no longer be apposite if third-party payors can disallow payment because of an inconsistent stress test result.

The use of physiologic tests to supplement anatomic imaging does not confer objectivity; that is the function of the physician, who must interpret symptoms and testing dispassionately, without an agenda, to ascertain the correct treatment path. Accompanying the privileges of self-referral and self-assessment emanate a responsibility to protect patients from overutilization and unnecessary procedures, and to obtain their assent after a rigorous and truly informative discussion of pros and cons.

References


