

EDITORIAL COMMENT

Is There a Role for Routine Stress Testing After Multivessel or Left Main PCI?*



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In general, practice guidelines recommend coronary artery bypass grafting over percutaneous coronary intervention (PCI) for patients with multivessel coronary artery disease (CAD) and moderate to severe left ventricular dysfunction (ejection fraction $\leq 35\%$), and those with left main (LM) disease¹ based on available evidence.² However, data from several recent studies and meta-analyses have reported that patients with low-to-medium anatomic complexity LM disease have similar survival with PCI and coronary artery bypass grafting.³ Recent advances in drug-eluting stent technology, procedural techniques, and adjunctive pharmacology have led to significant increase in use of PCI for patients with multivessel or LM CAD in clinical practice.

Patients with chronic coronary disease (CCD) and especially those with multivessel or LM CAD treated with PCI are at elevated risk for future cardiovascular events and should have regular outpatient visits.⁴ Key components of the management of these patients include long-term risk factor modification and guideline-directed medical therapy in maximally tolerated doses.^{1,5} Furthermore, based on available evidence, follow-up stress testing should only be performed when there has been a significant change in symptom and/or clinical status.¹ Periodic recording of the standard resting 12-lead electrocardiogram in patients with CCD during outpatient visits may

provide a baseline electrocardiogram against which future tracings during symptoms may be compared to avoid overdiagnosis of a change in clinical status.

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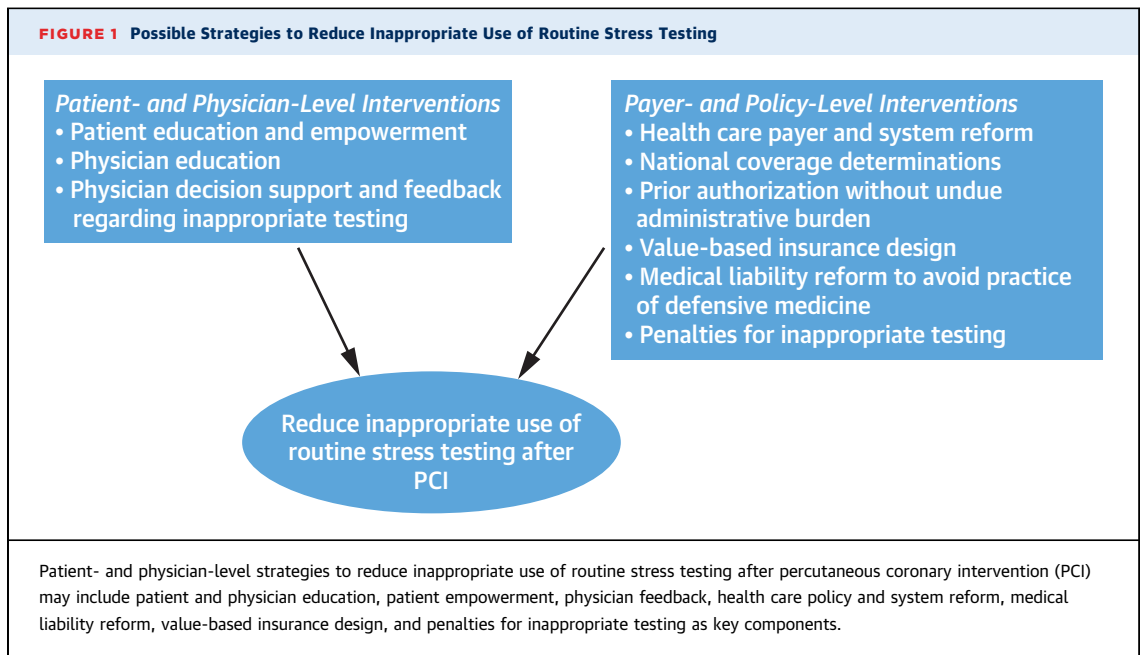
In this issue of the *Journal of the American College of Cardiology*, Lee et al⁶ determined the prognostic role of routine functional testing in a subgroup of patients with multivessel or LM CAD who underwent PCI using data from the POST-PCI (Pragmatic Trial Comparing Symptom-Oriented versus Routine Stress Testing in High-Risk Patients Undergoing Percutaneous Coronary Intervention) randomized trial comparing a follow-up strategy of routine functional testing at 1 year vs standard care alone after high-risk PCI.⁶ In high-risk patients with multivessel or LM CAD, the study found that there was no incremental clinical benefit from routine surveillance functional testing compared with standard care alone during follow-up and study findings do not support a routine functional testing strategy after multivessel or LM PCI.⁶ The findings of this subgroup analysis are consistent with the results of the primary analysis of the POST-PCI trial which did not show any benefits of routine stress testing among patients with high-risk anatomical features or clinical characteristics who had undergone PCI.⁷ The incidences of revascularization were more than twice in the stress testing group compared to the standard care group without meaningful differences in the rates of death or myocardial infarction suggestive of unnecessary procedures without benefit.⁷

These study findings further corroborate evidence from the ISCHEMIA (International Study of Comparative Health Effectiveness with Medical and Invasive Approaches) trial in which patients with moderate-to-severe ischemia on stress testing were randomly assigned to an initial invasive or conservative strategy with no reported difference between

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the 2 strategies in the primary clinical endpoint at 5 years of follow-up.⁸ Furthermore, the extent of ischemia on stress testing did not identify a subgroup of patients that derived a benefit from an invasive strategy.⁹ Based on these and other data, the totality of evidence at this time underscore the lack of benefit of routine stress testing in asymptomatic patients.

These findings support current clinical practice guidelines which provide a Class III indication for routine stress testing after PCI and state that, “in patients with CCD without a change in clinical or functional status on optimized [guideline-directed medical therapy], routine periodic testing with coronary [computed tomography] angiography or stress testing with or without imaging is not recommended to guide therapeutic decision-making.”¹ The appropriateness-of-use criteria states that stress testing is rarely indicated within 2 years after PCI procedures.¹⁰ Despite lack of benefit with routine stress testing and clinical guidelines recommending against it, analysis from the national cardiovascular data registry shows that, in the United States, ≈50% of patients undergo stress testing within a median of 2 years after PCI, with patients who have higher risk features at baseline paradoxically less likely to undergo post-PCI stress testing.¹¹ One study suggested that fee-for-service physician payment for stress testing creates incentives for overtesting.¹² This is further supported by another study reporting that stress testing after

PCI appears discretionary, favoring patients with higher socioeconomic status.¹³

Evidence suggests that there is little justification for routine stress testing after multivessel or LM disease PCI in the absence of other clinical signs or symptoms suggestive of stent failure. However, despite lack of evidence, there is widespread use of routine stress testing after PCI. A scientific statement from the American Heart Association has designated routine stress testing in patients after coronary revascularization as low-value care.¹⁴ Low-value health care services such as routine stress testing after PCI that provide little or no benefit to patients are commonly performed, potentially harmful, and expensive. Reducing low-value care is critically important to cardiovascular medicine given the high prevalence and costs of cardiovascular disease in the United States.¹⁴ **Figure 1** shows a multipronged approach to mitigate this overuse including physician education, payment reform for inappropriate testing, and possible penalty for inappropriate use of these tests.¹⁴

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