

REFERENCE

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Percutaneous Revascularization for Stable Coronary Artery Disease

Temporal Trends and Impact of Drug-Eluting Stents

We read with great interest the paper by Hilliard et al. (1) in *JACC: Cardiovascular Interventions* and congratulate the investigators on a very well-done and important analysis. Many of those who have criticized the COURAGE (Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation) study as not being “generalizable” to contemporary clinical practice (e.g., only 6% of screened patients were randomized, percutaneous coronary intervention [PCI] was substandard, too many patients enrolled from Veterans Affairs and Canada, very low rate of drug-eluting stent usage, adherence to optimal medical therapy was not achievable in the real world) should be reassured by the Mayo Clinic data. The Mayo data indicate that procedural success and technical proficiency continue to evolve and improve, in-hospital mortality and target vessel revascularization continue to decline, and results achievable in the real world might even be better if more robust optimal medical therapy were more widely embraced and used.

The fact that the rates of death, death/myocardial infarction (MI), and revascularization in COURAGE at 4.6 years are virtually identical to the rates reported from Mayo at 4 years supports the concept suggested by the results of COURAGE that these late events (and need for subsequent revascularization) are not being driven by the stenoses that are initially “being fixed,” but rather by new plaque ruptures in non-flow-limiting vessels. Moreover, we note that the patient population undergoing PCI at Mayo between 1997 and 2003 was remarkably similar to patients enrolled in COURAGE during the same time period. Table 4 of Hilliard et al. (1) cites certain baseline characteristics of the Mayo population that were higher risk than those of the COURAGE population, but the investigators do not comment on the higher rates of diabetes (32% vs. 24%), multivessel coronary artery disease (69% vs. 51%), and left anterior descending coronary artery disease (68% vs. 47%) in the COURAGE PCI cohort as compared with the Mayo patients (2,3). Additionally, in their Table 1 (1), only 13% of patients in the Mayo Clinic cohort had a positive stress test as the predominant indication for PCI, whereas in COURAGE, all patients had objective evidence of myocardial ischemia (2,3). Thus, when a more comprehensive list of characteristics is analyzed it appears the Mayo and COURAGE PCI cohorts were indeed very comparable populations of North American stable angina patients. This is underscored further by the performance and outcomes of the PCI procedures that were very comparable in both studies and similar to contemporary practice in the National

Cardiovascular Data Registry (4). The difference in procedural success noted in Table 4 (89% vs. 94%) of Hilliard et al. (1) is likely due to differing definitions (COURAGE excluded all periprocedural MIs whereas Mayo only excluded Q-wave MIs).

Based on these important observational data from a center widely acknowledged for excellence in PCI and which serves to validate the quality of PCI in COURAGE, there can no longer be any debate that optimal medical therapy is the cornerstone of management for all patients with stable coronary artery disease and should be the initial management strategy as concluded by the COURAGE study. We also enthusiastically concur with Hilliard et al. (1) that contemporary PCI is even safer and more efficacious than in the bare-metal stent era and is an important complement to optimal medical therapy for symptom relief in patients with angina that cannot be controlled by medications. Despite these advances, it is also noteworthy to emphasize that there has been no change in the unadjusted rates of mortality or the combined end point of death or MI in the drug-eluting stent era (2003 to 2006) as compared with the bare-metal stent era (1997 to 2003) in the Mayo observational experience. Lastly, the hypothesis that coronary revascularization improves prognosis in patients with severe ischemia is intriguing, but remains unproven, and must be evaluated in a rigorously designed and performed randomized clinical trial.

*Steven P. Sedlis, MD
William E. Boden, MD

*Veterans Affairs (VA) New York Harbor Health Care System and New York University School of Medicine
423 East 23rd Street
New York, New York 10010
E-mail: Steven.Sedlis@med.va.gov

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Reply

We thank Drs. Sedlis and Boden for their interest in our article in *JACC: Cardiovascular Interventions* (1). Although we agree that our study suggests that “COURAGE-like” results are being achieved in clinical practice, the analysis was not intended to investigate the generalizability of the trial (1,2). It is reasonable to propose that