Journal of the American College of Cardiology Vol. 59, No. 4, 2012

ISSN 0735-1097/$36.00

CORRESPONDENCE

Letters to the Editor

Selection Bias in "Prognostic Impact of Staged Versus 'One-Time' Multivessel Percutaneous Intervention in Acute Myocardial Infarction"

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doi:10.1016/j.jacc.2011.09.057

Kornowski et al. (1) should be commended for attempting to validate the current guidelines regarding staged versus "one-time" stenting in the setting of an acute ST-segment elevation myocardial infarction. Their recent article in the *Journal* was a prespecified secondary analysis of the HORIZONS-AMI (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction) cohort.

Given the high likelihood of measured and nonmeasured baseline differences between the groups who received multivessel stenting in either a staged or "one-time" fashion, the researchers took pains to limit confounding through multivariate and propensity score modeling. Unfortunately, such modeling cannot account for the patients who had multivessel coronary disease but were never included in this analysis because they developed contraindications (e.g., renal failure or neurological complications) to repeat percutaneous coronary intervention (PCI) or died before a second PCI attempt. This survival-based selection bias clearly favors the staged approach by excluding patients in the HORIZONS-AMI trial with multivessel disease who received only culprit artery stenting because they did not survive long enough (or well enough) to have their other lesions treated. Figures 2 and 3 of their paper (1) corroborated that the majority of deaths in the "one-time" group happened within the first few days of the index event. Meanwhile, the median time between first and second PCI events in the staged group was 30 days later (range 6 to 51 days).

The analysis presented by Kornowski et al. (1) corroborated the current American Heart Association/American College of Cardiology Class III Level of Evidence: B guidelines that "PCI should not be performed in a noninfarct artery at the time of primary PCI in patients without hemodynamic compromise." Although the guidelines are clear, there have been discordant, albeit potentially flawed, results in recent published reports regarding this practice (2,3), and it remains more common than might be explained by cardiogenic shock alone (4). Unfortunately, the selection bias inherent to the study by Kornowski et al. (1) may have limited its ability to definitively settle any lingering questions about "one-time" multivessel stenting in the setting of an AMI without hemodynamic compromise. A report on the total number of patients with multivessel coronary disease at the time of primary angiography in the HORIZONS-AMI trial and their outcomes classified by number of vessels stented (1 vs. >1) and timing (staged vs. "one time") of their PCI would help us understand how much selection bias affected the reported results.

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Reply

We thank Drs. McCabe and Armstrong for their valuable comment in regards to our paper (1). In general, we tend to agree with them but also want to mention that we clearly stated in the article that despite the best propensity-controlled analysis and given the risk of residual confounding, a randomized trial is required to definitively address this issue. We also agree that the results of patients in the single-treatment multivessel arm may be "biased" because of peri-procedural complications; however, as we also pointed out in the article, some of these procedures may have been instigated by a more complex and lengthy single procedure, such as contrast nephropathy, which might have been avoided with a more judiciously staged procedure strategy. Thus, these data were consistent with the current American Heart Association/American College of Cardiology and European Society of Cardiology guidelines to only treat the infarct artery, pending the results of a more definitive randomized controlled trial. Finally, we are preparing a paper about the effects of multivessel versus single-vessel disease, the results of which are forthcoming.

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