EDITORIAL COMMENT

Catheterization After Myocardial Infarction and the Mismeasure of Un-American Inactivity*

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In this issue of the Journal, Batchelor et al. (1) compare the diagnostic yield of coronary angiography in the U.S. and Canadian patients enrolled in the Global Use of Strategies to Open Occluded Arteries in Acute Coronary Syndromes (GUSTO-1) trial. They defined yield as severe coronary artery disease (CAD), more specifically left-main or three-vessel disease. The rates of angiography on the index hospital admission in the U.S. were 71%, as compared with only 27% in Canada. They expected that conservative use of angiography in Canada would lead to greater selectivity and higher diagnostic yield. It did not.

The two-and-a-half-fold higher rates of angiography in the U.S. resulted in a two and a half-fold difference in the number of patients identified with severe CAD (i.e., 12 vs. 4.6 cases of severe CAD per 100 post-MI (myocardial infarction) patients in the U.S. and Canada, respectively). Using estimates from a meta-analysis of survival after coronary surgery versus medical therapy (2), Batchelor et al. (1) projected that the increased absolute detection rate of severe CAD could result in a marginal survival benefit of 5 per 1,000 patients at five years, assuming equivalent rates of surgical revascularization in both groups. The authors concluded that adopting more aggressive U.S. strategies could result in modest but meaningful improvements in long-term post-MI outcomes.

Batchelor et al. (1) have conducted an important and innovative study. However, we have some concerns about their methods, results and conclusions.

From the standpoint of external validity, the GUSTO-1 cohort is highly selected and not closely representative of the populations of persons who suffer an acute myocardial infarction (AMI) in Canada (3) or, we surmise, the U.S.

Internal validity is also at issue in several respects as follows. Batchelor et al. (1) have not placed the detection of three-vessel and left-main disease in a clinical context. Derived long-term benefits from surgical revascularization have been shown to correlate with preoperative demonstrable ischemia, independent of coronary anatomic subgroups (2,4). The meta-analysis by Yusuf et al. (2) found that the survival benefits of surgical revascularization for patients with stable angina were greater not just as a function of more extensive coronary disease, but also in the presence of more severe symptoms, abnormal ejection fraction, a history of hypertension or diabetes and a history of myocardial infarction. Accordingly, a highly symptomatic diabetic patient with two-vessel disease may be at higher risk than an asymptomatic nondiabetic patient with triple-vessel disease.

The investigators also do not consider the related possibility that not all patients with three-vessel or left-mainstem disease benefit equally from surgical revascularization. Ascertainment of the incremental predictive value of anatomy only after considering other clinical parameters is particularly relevant given the natural sequence of investigation of patients following AMI in nations other than the U.S., where far fewer patients undergo catheterization before discharge from their index admission.

These limitations threaten the validity of the investigators’ conclusion that a conservative post-MI catheterization strategy was not more efficient or selective than an aggressive strategy. After all, the primary purpose of post-MI risk stratification is not to identify anatomy, but to identify markers of adverse clinical prognosis. In this respect, the American–Canadian catheterization rate ratio was significantly lower for patients with complications (2.1, 95% confidence interval [CI]: 2.0–2.3) or recurrent ischemia (1.9, 95% CI: 1.8–2.1), as compared with overall (2.6, 95% CI: 2.4–2.8).

No data were available concerning the results of catheterization after discharge. As Batchelor et al. (1) state, postdischarge rates of catheterization appear to be similar in Canada and the U.S. However, equivalence occurs despite the fact that over 70% of U.S. patients were already catheterized before discharge. This situation makes it unlikely that the patients selected for downstream catheterization in Canada are similar to those in the U.S. If postdischarge investigation in Canada is driven by the results of tests for risk stratification or the occurrence of recurrent ischemia, the marginal yields of catheterization—understood not in the narrow anatomic sense but with respect to patients’ overall expectations of clinical benefits—may indeed be higher with more selective utilization.

The investigators’ analytical paradigm leads them to suggest that Canada must increase its rate of catheterization to detect the same absolute proportion of patients with severe coronary disease as the U.S. More catheterization for

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post-MI patients in Canada may well be justifiable, but we are not convinced by the specific arguments of Batchelor et al. (1), given the uncertain generalizability of this study and the myriad influences other than coronary anatomy that affect post-MI survival.

Batchelor et al. (1) also urge the importance of developing algorithms for selective catheterization that rely on clinical predictors or noninvasive tests to detect patients with a high probability of extensive coronary disease. As we see it, this may be too anatomically focused. The primary purpose of risk stratification is not to detect three-vessel or left-mainstem disease, but to identify those with an adverse prognosis (5). Put another way, we are less concerned about the failure of selective catheterization to detect all patients with three-vessel and left-mainstem disease than with the paradox that Batchelor et al. (1) rightly highlight: early in-hospital catheterization is more likely for patients with a better baseline prognosis in both countries. As noted, whether this is true in both countries for downstream outpatient catheterization remains to be determined.

Last, if we were to accept that there could theoretically be a survival benefit of 5 per 1,000 lives at five years from increased detection of severe CAD, Batchelor et al. (1) did not model the practical implications of their strategy. Not only would their approach be very costly, but most patients would not achieve any survival benefit, and many more would be exposed to the potential hazards of angiography and revascularization procedures. Marginal gains for a few must be weighed against the lack of benefits and potential hazards for many. In these circumstances, it is hardly surprising that both randomized and observational studies that have compared aggressive to conservative strategies post-MI have failed to demonstrate significant mortality differences between groups (6–11).

Wide regional variations in angiography and revascularization rates around the world continue to prompt questions regarding the existence of a “correct” or “optimal” procedural rate post-MI. Because many studies have shown similar mortality outcomes, decisions about the appropriate rates of catheterization may ultimately rest more on how each society values small improvements in the quality of patients’ lives as opposed to survival gains per se. For most societies that are unable or unwilling to emulate “the American way,” post-MI risk stratification will remain an imperfect but very important process for selecting the patients who should undergo catheterization and for setting a context for any anatomical findings at catheterization. A key challenge for future research is to refine these selection strategies and improve the prognostic information obtained from measures other than angiographically defined anatomy.

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REFERENCES