EDITORIAL COMMENT

Radial Access for Rescue Percutaneous Coronary Intervention
Underutilized and Underappreciated*

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Although the adoption of radial access for percutaneous coronary intervention (PCI) in the United States was delayed as compared with the rest of the world, there has been a recent acceleration in the widespread utilization of this access site for PCI. From 2007 to 2012, transradial PCI increased from 1.0% to 16.2% of the PCI procedures in the United States, and is further increasing (1,2). Data demonstrating lower-access and nonaccess-site bleeding associated with radial access, improved and dedicated radial access equipment, and the wide dissemination of radial-specific training have all contributed to the shift in access site strategy (3). Transradial PCI in acute coronary syndrome (ACS) and ST-segment elevation myocardial infarction (STEMI) patients also appears to be associated with lower mortality, although no unequivocal mechanistic link for this mortality reduction has been identified (3,4). Nevertheless, the negative long-term adverse effects of bleeding after PCI are well recognized, and the European guidelines for PCI have weighed in on the subject, giving radial access a Class I indication for ACS patients undergoing PCI (5).

In this issue of JACC: Cardiovascular Interventions, Kadakia et al. (6) present the results of the largest study of rescue PCI from the American College of Cardiology National Cardiovascular Data Registry’s CathPCI Registry. Over 4 years (2009 to 2013), 9,494 STEMI patients underwent rescue PCI after failed fibrinolytic therapy; amazingly, only 14.2% of these patients were treated transradially, whereas 85.8% had transfemoral access. The transradial patients were slightly younger, with lower prevalence of hypertension, dyslipidemia, chronic lung disease, or history of coronary artery bypass graft surgery. Fluoroscopy time was slightly longer, thienopyridine and glycoprotein inhibitor use were comparable, and the use of unfractionated heparin was higher in the transradial group. Successful treatment of the culprit lesion was high and similar with both strategies (96.1% radial and 94.7% femoral; p = 0.06).

As in multiple previous studies (3,7–10), in an unadjusted analysis, lower access site bleeding (0.2% radial vs. 1.1% femoral; p = 0.001), overall bleeding (6.9% radial vs. 12% femoral; p < 0.0001), blood transfusion requirement (1.1% radial vs. 2.8% femoral; p = 0.0003), and a trend favoring mortality reduction (1.7% radial and 2.6% femoral; p = 0.05) were observed with radial access. However, inverse probability of treatment weighting–adjusted analysis did not reveal a difference in mortality (odds ratio [OR]: 0.81; 95% confidence interval [CI]: 0.53 to 1.25; p = 0.35), but radial access remained associated with lower bleeding (OR: 0.67; 95% CI: 0.52 to 0.87; p = 0.003). Importantly, using gastrointestinal (GI) bleeding as a falsification endpoint, lower GI bleeding (OR: 0.23; 95% CI: 0.05 to 0.98; p = 0.05) was observed in the transradial group. As arterial access site should not have an effect on GI bleeding, this “negative control” finding suggests that confounders

*Editorials published in JACC: Cardiovascular Interventions reflect the views of the authors and do not necessarily represent the views of JACC: Cardiovascular Interventions or the American College of Cardiology.

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that cannot be assessed from the data collected in the CathPCI Registry exist, and potentially, patients with greater comorbidities or at higher risk of bleeding are being treated with femoral access.

The investigators should be congratulated for conducting the largest study of rescue PCI, and it is remarkable that the use of radial access for rescue PCI is <15% in contemporary interventional practice in the United States. The study includes a broad patient population, only excluding those requiring hemodynamic support, receiving chronic hemodialysis, undergoing in-hospital coronary artery bypass graft surgery or multiple PCI procedures, or having received fibrinolytic therapy more than 72 h before catheterization. Having just received fibrinolytic therapy and failing reperfusion (median time of fibrinolytic therapy to cardiac catheterization: 189 min), these patients would be at high risk for bleeding especially if bailout glycoprotein IIb/IIIa inhibitors were subsequently required. The investigators also report the presence of a “risk-treatment paradox,” with the patients at the lowest risk of bleeding among the rescue PCI cohort being treated transradially. The existence of a difference in the baseline risk of bleeding in the transradial and transfemoral groups was suggested by the falsification endpoint of GI bleeding (0.2% radial vs. 0.9% femoral; \( p = 0.006 \)) and confirmed by an elegant analysis evaluating the pre-procedural bleeding risk profile of the 2 groups. Patients who underwent transfemoral rescue PCI were, in fact, at a higher risk of bleeding (10.2 ± 8.2% radial vs. 12.0 ± 8.5% femoral; \( p < 0.0001 \)), and as previously reported (11), this study is another example of the failure to adequately utilize radial access as a bleeding avoidance strategy in the highest-risk patients.

Furthermore, as an access strategy, the radial artery remains scarcely utilized in STEMI patients (1). Despite extensive attention to the subject over the past decade, in 80% of the hospitals in the United States, radial access is still used in <10% of PCI procedures (2). Multiple explanations may exist for the limited utilization of radial access for rescue PCI patients, a group that is at among the highest risk of bleeding. These include inadequate training with the technique, especially in low-volume centers and amongst low-volume operators; perceived ease of femoral access in the more critically ill patients; consideration of hemodynamic support if subsequently required; or underappreciation of bleeding as an independent significant adverse event. The current analysis, especially with the negative control of a GI bleed endpoint, suggests that as patients with a greater number of comorbidities are being treated via femoral access, reduction in nonaccess-site bleeding and mortality associated with the radial access in prior observational studies might also be a result of confounding variables that are impossible to control for in propensity-matched or multivariable analyses. Randomized trials have yielded conflicting results on the subject, although an updated meta-analysis, including the large MATRIX Access (Minimizing Adverse Haemorrhagic Events by TRansradial Access Site and Systemic Implementation of angioX) trial, supports the hypothesis that there is a mortality reduction with transradial PCI in ACS patients (3). Although the data regarding mortality reduction with radial access is controversial due to the lack of a clear mechanistic link, especially in elective PCI patients, the reduction in major and minor access site bleeding is uncontested. However, the equivocal message on mortality reduction with radial access for PCI might have contributed to a slower adoption for this approach by the majority of practicing interventionalists.

A surprising observation from the current analysis is the relatively low mortality for rescue PCI patients. This might represent the improved contemporary PCI practice, better pharmacotherapy, or perhaps the relatively short time period between fibrinolytic therapy administration and rescue PCI. It could also be due to the exclusion of the critically ill patients who required hemodynamic support or in-hospital coronary artery bypass graft/multiple PCI procedures from the analysis. This could also have contributed to the inability to demonstrate a mortality difference with the radial access approach.

Despite the increase in use of the radial access for PCI overall, it appears that the adoption of radial PCI for acute STEMI patients remains limited in the United States (1,2). The explanation may lie with the concern for meeting door-to-balloon time goals and the possible delay in reperfusion as a result of operator inexperience with radial PCI; yet, the underutilization for rescue PCI after failed fibrinolytic therapy is puzzling. The underlying reasons for this cannot be ascertained from the current analysis, and future investigation should focus on identifying them. This could then lead to the implementation of transradial PCI and other bleeding avoidance strategies for patients at the highest risk of bleeding after PCI.

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KEY WORDS rescue PCI, STEMI, transradial access