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LETTERS TO THE EDITOR

What Determines Propensity Score Depends on What We Are Determining Propensity For

Comment on a Recent Analysis of Arterial Access Route in Acute Myocardial Infarction

Valgimigli et al. (1) presented a retrospective analysis of the risk of bleeding and vascular complications with a transradial approach versus transfemoral access in patients presenting with acute myocardial infarction and reported a significantly lower rate of adverse events with transradial intervention. While we believe strongly in the benefits of transradial access, we have some serious reservations regarding the way that propensity score matching was used in this study.

In their analysis, the authors sought to derive 2 comparable groups of patients from a highly biased registry and propensity matching is a very good method to achieve this, particularly considering the high quality of clinical information contained in the registry. However, our concern regarding the analysis centers on their inclusion of angiographic data in the derivation of the propensity score. Details, such as culprit vessel, lesion length, and type of stent cannot possibly be known before the route of access is decided. It is therefore not appropriate to control for these elements through propensity matching (2,3), as they cannot influence the choice of arterial approach.

We do, however, agree that these important variables should be accounted for in the final analysis, but they would be more appropriately addressed with multivariable regression, as would be done for post-procedure data. What impact this had on the magnitude and direction of the results remains to be determined.

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Reply

We welcome the comments provided by Dr. Potter and colleagues on our recent article on the transradial intervention REAL (REgistro Regionale AngiopLastiche Dell'Emilia-Romagna) multicenter registry (1).

The way our propensity-matched and adjusted comparison between transradial versus transfemoral intervention was constructed follows the nonparsimonious principle (2). We first analyzed all variables included in the database, which were significantly not homogenously distributed between the 2 study arms. This model is frequently referred to as a parsimonious explanatory model that identifies the common denominators of group membership. "Parsimonious" means "simple," meaning a model limited to factors deemed statistically significant.

Once this traditional modeling was completed, a further step was taken to generate the "propensity model." The traditional model was augmented by other factors, even if not statistically significant. Thus, the propensity model was not parsimonious. The goal was to balance patient characteristics by incorporating "everything" recorded that might relate to either systematic bias or simply bad luck. We agree on the concept that, in the setting of an ideal scenario, angiographic data are not known at the time of access site selection and therefore cannot influence the choice toward transradial versus transfemoral access site. Yet, as acknowledged by Dr. Potter and colleagues, the retrospective assessment of whether the access site selection impacted on outcomes in the setting of a highly biased registry is far more problematic, because it would be impossible to adjust for nonmeasured confounders.

Let us consider the case-base scenario of a "fragile" lady with multiple comorbidities and bleeding history undergoing primary intervention. This hypothetical patient is far more likely to receive bare-metal than a drug-eluting stent implantation at the time of intervention. Clearly, the stent choice has no role in explaining the propensity of this lady to undergo transradial or transfemoral access site. Yet, factoring the stent choice into the model might help correcting for biases, which might not have been properly captured in the case report form of the registry. Although our dataset is extensive and allows correcting for multiple factors—as nicely acknowledged by Dr. Potter and colleagues—in a nonrandomized setting it might be difficult to truly eliminate all potential confounders between groups.

We have introduced, in other terms, the angiographic data into the propensity model as potential "marker" of variables, which were unmeasured and as such could potentially bias the study results. Imagine a patient whose coronary anatomy is known to be particularly complex for the presence of massive tortuosity and calcification thanks to a previous coronary angiogram—which was