Circulation: Cardiovascular Quality and Outcomes

EDITORIAL

Transradial Percutaneous Coronary Intervention... Works Great! Less Billing!

See Article by Mamas et al

Amer Kasim Ardati, MD, MSc
David J. Cohen, MD, MSc

In randomized clinical trials percutaneous coronary intervention (PCI) via transradial access (TRA) has been shown to have substantial advantages over the traditional transfemoral approach (TFA). These advantages are most evident in acute coronary syndrome patients and women—subgroups with higher than average bleeding risk.[1] In addition, observational studies based on national registry data have shown an association between increased TRA adoption and a reduction in PCI-related adverse events.[2,3] Despite these advantages, however, TRA utilization in the United States has remained relatively low, with rates only recently beginning to exceed 25% nationally in the last 2 years.[4]

The superiority of TRA compared with TFA with respect to clinical outcomes cannot be understated. In a meta-analysis of >22 000 patients enrolled in contemporary prospective randomized clinical trials comparing TRA with TFA, all-cause mortality, major adverse cardiac events (composite of death, stroke, and myocardial infarction), bleeding, and vascular complications were all substantially lower with the radial approach.[1] Although the implications of these findings for patient care are fairly obvious, the economic implications are less intuitive. Nonetheless, several studies based on both randomized trial and observational data have suggested that the use of TRA results in lower costs than TFA.[5–7]

In this issue of *Circulation: Cardiovascular Quality and Outcomes*, Mamas et al[8] have added to the body of literature demonstrating the economic advantages of the TRA approach. Using the data from the British Cardiovascular Intervention Society database, they estimated hospital costs for all patients undergoing PCI (including emergent, urgent, and elective procedures) in the United Kingdom from 2010 to 2014. Although the British Cardiovascular Intervention Society database contains a large number of data elements, many aspects of procedural resource utilization (including procedure duration and specific numbers of single-use devices [such as balloons, stents, wires, etc]) are not collected. Therefore, procedural costs were based on average costs for a typical TRA or TFA PCI procedure, with additional costs assigned for expected rates of access site crossover. In contrast to procedural costs, costs for vascular complications and bleeding were assigned based on the observed occurrence of these events, using cost estimates from national data sources. Finally, daily costs associated with routine hospital care and ancillary services were assigned based on a standard average for the United Kingdom. To adjust for differences between the TRA and TFA groups, 1:1 matching based on year of treatment and PCI indication as well as a propensity score derived from preprocedure covariates was used.

In this propensity-matched comparison of nearly 250 000 patients, the authors found that costs were roughly £250 less per procedure (≈$354 based on the current exchange rate) with TRA than with TFA. The extent of cost savings varied by

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year and also by indication, ranging from a low of £153/procedure in elective PCI to a high of £348/procedure in patients undergoing primary PCI for ST-segment–elevation myocardial infarction (STEMI). Based on these estimated cost differences, population-level analyses suggested that over the 5-year period encompassed by this study, the use of TRA saved the UK healthcare system >£13 million. Had all operators adopted TRA at the rate of the region with the highest utilization, however, cost savings of >£33 million could have been achieved—suggesting a major lost opportunity.

Given the observational nature of this study as well as the use of fixed estimates based on external data for many of the unit costs, it is appropriate to consider whether the results of this study are truly valid—particularly with respect to the extent of cost savings. It is tempting to attribute the cost savings to reductions in vascular and bleeding complications. However, the analysis suggests that only a tiny minority of the economic benefit (≈2%) was related to reduced complications, although roughly 75% was because of reduced length of stay (LOS) and the remainder because of reduced procedural costs (which were not actually measured in the study).

Whether the observed LOS differences in this study (which range from 0.38 days in the elective PCI cohort to 0.98 days in the STEMI cohort [based on 2014 data]) are real is thus central to understanding its results. One factor that is unlikely to explain these differences is reduced complications. With absolute risk differences of <1% for both bleeding and vascular complications, and assuming that each complication adds 6 days to hospital LOS, this benefit would only account for a maximum of 0.12 days of LOS reduction. Thus, it is clear that much of the observed LOS reductions with TRA (and the projected cost savings) must be attributable to reduced LOS among patients with otherwise uncomplicated procedures. A second possible explanation for these large differences in LOS is residual confounding that was not adequately accounted for by propensity matching. Finally, it is possible that these differences in LOS reflect variation in practice patterns between high radial access centers and lower radial access centers. For example, it is possible that, recognizing the greater convenience and safety associated with TRA, some centers may have modified their care pathways in ways that would encourage earlier discharge.

Whether these benefits should be attributed directly to the use of TRA or are simply the by-product of greater TRA adoption by centers that were committed to highly efficient care is impossible to determine given the observational nature of the study. For example, it is possible that much of the LOS reduction in elective PCI procedures was related to same-day discharge. This explanation is unlikely to explain the LOS differences in the non-STEMI or STEMI setting, however. In the future, alternative analytic approaches such as the use of center-level TRA adoption rates as an instrumental variable might provide additional insight into the extent that unmeasured confounding played a role in these findings.[9]

With these limitations in mind, it is important to place this study within the context of other published economic assessments of TRA utilization. Studies in the United States have suggested that TRA saves between $275 and $830 per patient compared with TFA.[5,10] Similarly, a large single-center cohort study in China suggested savings of $1283/patient.[6] Like the current study, these previous studies have also found that the much of the cost savings with TRA were related to reduced LOS.

One of the most unique aspects of this study is the use of national data to estimate the extent of cost savings achieved through TRA to the UK healthcare system and the lost opportunity of slow adoption in certain regions. Although this study was based on UK practice patterns, these findings have implications for the United States as well. In an era in which most medical advances come at a higher price tag, more rapid and complete adoption of TRA would seem to be the rare no-brainer intervention that improves clinical outcomes and lowers healthcare costs.[11]

Given these findings, one may question why has adoption of a radial first approach to PCI been relatively slow in the United States? Consistent increases in procedural time and radiation exposure for both patients and operators are a frequent critique of TRA. Although the impact of modest differences in radiation exposure is likely to be small for the individual patient, especially when weighed against the very real clinical advantages of TRA, the greater occupational exposure for the PCI operator and catheterization laboratory staff is a valid concern. Other concerns have been potential delays in the door-to-balloon time in STEMI with use of TRA by less experienced operators as well as the learning curve for TRA among low-volume PCI operators. Nonetheless, given the proven advantages of TRA with respect to both bleeding and mortality, it is somewhat surprising that there has not been a greater push by professional societies and payers to nurture and accelerate the utilization of TRA in the United States (similar to the efforts to reduce door-to-balloon time).

In the 1960s, a new beer was developed which promised to provide consumers with the pleasure of ale consumption with the lower caloric intake. First marketed as a diet beer the product failed to make a commercial impact.[12] After passing through several hands, the product was finally purchased by the Miller Brewing Company, which marketed the beer as "Miller Lite" and promised that it would "Taste Great!" and be "Less Filling!" The simple change in paradigm from "Diet" to "Lite" along with the use of sport-celebrity

brand ambassadors overcame substantial barriers to adoption that had previously prevented consumers from enjoying this new product.

Perhaps it is time for the US cardiology community to take a lesson from the beer marketers. Although TRA advocates have long advocated the superiority of radial access for patient comfort and safety, perhaps our fragile egos will be more easily overcome by the promise of better hard outcomes and lower cost to our overburdened healthcare system. Transradial access… Works Great! Less Billing!

ARTICLE INFORMATION

Correspondence

Amer K. Ardati, MD, MSc, University of Illinois Chicago, 840 S Wood St M/C 715, CSB 934, Chicago, IL 60612. E-mail aardati@uic.edu

Affiliations

Department of Medicine, Division of Cardiology, University of Illinois Chicago, College of Medicine and Jesse Brown Veterans Affairs Medical Center Chicago (A.K.A.). Saint Luke's Mid America Heart Institute, University of Missouri-Kansas City, School of Medicine (D.J.C.).

Disclosures

None.

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