

EDITORIAL COMMENT

# Radial Access in Patients Invasively Treated for Acute Coronary Syndromes

## A Lifesaving Approach\*



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The first series of coronary angiograms obtained by transradial access (TRA) and the first TRA percutaneous coronary intervention (PCI) were reported in 1989 and 1993, respectively (1,2). Since then, many trials and meta-analyses have shown that TRA compared with the transfemoral approach (TFA) is associated with fewer vascular and bleeding complications and transfusions as well as improved patient comfort and lower cost (3-5). During the past decade, an association between bleeding and ischemic events, including fatal ischemic events, has been increasingly described in interventional studies (6). Nevertheless, the penetration rate of TRA still varies greatly around the world. Asia, Canada, and several European countries (e.g., France and the United Kingdom) have embraced TRA, whereas countries such as Germany and the United States still favor the TFA. After an initial wave of “radialists” in the United States in the mid-1990s, expansion of TRA was possibly slowed by the development of femoral vascular closure devices (7), which facilitated hemostasis, whereas TRA was associated with technical challenges and a steep learning curve.

The body of evidence favoring TRA has been reinforced with the recent publication of 2 large multicenter, randomized trials comparing TRA and TFA among patients treated invasively for acute coronary syndromes (ACS). In 2011, the RIVAL (Radial Vs femoral access for coronary intervention) trial reported the results of high-volume PCI operators with

minimal experience of 50 TRA cases (8). It failed to show any differences between both groups in the primary composite endpoint of death, myocardial infarction (MI), stroke, or major bleeding at 30 days. The trial was underpowered with regard to a lower rate than expected of major bleeding. However, there was a lower rate of local vascular complications with TRA, and of the 6 pre-specified subgroups, there appeared to be a reduction in the primary outcome with TRA in the high-volume radial centers and in patients with ST-segment elevation MI. In 2015, MATRIX (Minimizing Adverse Haemorrhagic Events by TRansradial Access Site and Systemic Implementation of angioX), the largest multicenter, randomized trial conducted at a high-volume radial center (operators with >50% of their procedures performed via TRA and at least 75 PCIs performed via TRA in the previous year), showed a reduction in net clinical events (a composite of major adverse cardiovascular events or major bleeding) with a number needed to treat of 56 (9). The differences between both groups were driven by a reduction in major bleeding and all-cause mortality.

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Of these previous trials, none were powered for mortality outcome. On the basis of this fact, Andò and Capodano (10) report in this issue of *JACC: Cardiovascular Interventions* an updated meta-analysis with data that are pooled in a random-effects meta-analysis with classic and trial-sequential techniques. Their meta-analysis involves 17 randomized trials comparing TRA and TFA with 19,328 patients invasively treated for ACS. The major results are that TRA was superior to the TFA in reducing death (by 27%), major adverse cardiac events (by 14%), access-site bleeding (by 63%), major bleeding (by 40%), but no differences were found between approaches for recurrent MI or stroke.

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One of the limitations of such a meta-analysis is the absence of a standard definition of bleeding across the studies. Furthermore, the variable use of glycoprotein IIb/IIIa inhibitors may also have influenced bleeding events and mortality. Importantly, the reduction in mortality was concomitant with a significant reduction in major adverse cardiac events and both access-site and major bleeding. Therefore, any bleeding avoidance strategy could have a positive influence on mortality. In some cases of death not directly attributed to a bleeding event, the fatal cascade leading to death could have been initiated by a hemorrhagic event as supported by the post hoc study of the MATRIX trial discussed in the meta-analysis. Indeed, the association between bleeding events and mortality may be explained by different mechanisms such as abrupt discontinuation of antithrombotic therapies, prothrombotic states related to bleeding or blood transfusion, anemia, prolonged immobilization, and hospitalization (6).

The authors advocate that the current data are sufficient to consider a procedure performed using TRA as a lifesaving procedure in invasively treated ACS patients. After the MATRIX trial and before this meta-analysis, the latest European Society of Cardiology guidelines for ACS without persisting ST-segment elevation MI were already adapted and gave a Class I indication (Level of Evidence: A) for TRA to be the default approach at centers experienced in using TRA and recommended a transition from the TFA to TRA in centers treating ACS patients (11).

With the addition of the current data, it is time for resistance to TRA to subside. Exclusively TFA operators should be open to adopting TRA, and it seems appropriate to update the American College of Cardiology/American Heart Association non-ST-segment elevation MI guidelines. Along these lines, who would choose to undergo surgery performed by a surgeon using large incisions when minimally invasive or laparoscopic surgery could be safely performed? With the available data, the improvement of PCI equipment, the development of dedicated radial kits, and the implementation of radial training, we have already observed an increase in the rate of TRA PCI in the United States (1.2% in 2007 increasing to 16.1% in 2012) with a greater prevalence in the

Northeast (12). Cost savings with the use of TRA PCI (overall savings of \$830, with \$130 being procedural savings) was described in a U.S. trial and should further motivate high-volume centers (4).

Therefore, why not maximize the proportion of procedures performed using TRA? There is no firm reason against this. The only word of caution is that interventional cardiologists still need to master both approaches for those instances when crossover from TRA to the TFA is necessary or for insertion of an intra-aortic balloon pump, structural heart disease cases, or peripheral interventions. This is of particular importance for young interventionalists trained at TRA centers. Indeed, it is unlikely that all procedures could be performed via TRA. Even though procedural failure decreases with experience, crossover to the TFA will still be required (6.2% in the meta-analysis by Andò and Capodano [10]) secondary to the inability to gain radial access, anatomic variations, severe tortuosity, intense spasm, or potential lack of catheter support.

Proficiency in medical techniques and procedures requires adequate training and continued practice, not only for physicians, but also for nurses on the wards and catheterization laboratory teams. The existence of a paradoxical increase in vascular complications with the TFA in radial centers has been described and should be considered in training programs and by default radial operators (13). What is the optimal case distribution between TRA and TFA? There is no clear answer. The European consensus paper on TRA recommends performing at least 80 procedures via TRA annually and >50% of TRA procedures in routine practice once the learning curve is completed (14). In the MATRIX trial, when  $\geq 80\%$  of the procedures were performed via TRA, the benefits of TRA were the greatest. However, the real question might be what are the optimal and minimal volumes with which to maintain proficiency in PCI for ACS patients?

In conclusion, this meta-analysis further contributes to the body of evidence that TRA should be the default access for PCI in ACS patients.

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