

Radial artery access: an ongoing paradigm shift



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In the current issue of EuroIntervention Kazunori Horie et al report the results of an open-label, single-centre randomised study, comparing incidences of radial artery spasm during transradial coronary interventions (TRI) and post-procedural radial artery occlusion (RAO) using either a 6.5 Fr sheathless hydrophilic-coated guiding catheter or a 6.0 Fr Glidesheath Slender® (Terumo Corp., Tokyo, Japan).

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In keeping with previous data², they found that sheath/radial artery diameter predicts both post-procedural radial artery occlusion and the occurrence of radial artery spasm during the procedure. The outer diameter of the 6.5 Fr sheathless device is in fact smaller than the 6.0 Fr Glidesheath Slender outer diameter, as shown in Figure 1 of the authors' manuscript.

Not surprisingly, the intuitive hypothesis of having less radial artery injury during TRI leads to less occurrence of radial artery spasm and less post-procedural RAO.

Do we need such routine refinements in our daily TRI? Probably not, because using smaller 5 Fr guiding catheters routinely with traditional shapes and devices works very well and is not associated with ostial complications, as described by the authors. The fragility of smaller catheters is not observed in expert hands and permits most routine PCIs with the need to switch to 6 Fr guiding catheters only electively, as required for more complex procedures. As the default procedure, 5 Fr TRI is really effective, reducing the occurrence of both radial artery spasm and post-procedural RAO³. Furthermore, it was shown early in the transradial experience that having direct intra-arterial injection of calcium channel blockers reduces drastically the occurrence of spasm⁴, a pharmacological preventive action which was not used in the study of Horie et al, where only sublingual nitrate was given to the patients.

RAO is a quiescent complication that can be reduced to less than 1% using 5 Fr introducers in addition to preventive actions

such as shorter compression time in a patent haemostasis setting combined with use of a weight-adjusted dose of heparin⁵. Special attention is recommended in patients with small stature where the reduced diameter of the radial artery and prolonged compression can increase the rate of RAO. Decreasing the diameter of the sheath and catheters will reduce the risk of radial artery injury, spasm and subsequent RAO. Regarding the sheathless guiding catheter, it is an interesting option when larger guiding catheters are needed. The specific curves recommended by some physicians have low interest based on pioneers' experience and on a large international survey reporting that classic curves are generally used successfully worldwide, limiting the role of dedicated curves supposed to increase back-up during PCI⁶.

Based on the available evidence that continues to increase year after year, the European Society of Cardiology updated its guidelines in 2013 to state that radial arteries should be the default access site for PCI, including high-risk acute coronary syndromes. This confirms a paradigm shift in what was considered the standard access approach for cardiac catheterisations and coronary interventions⁷.

However, we have to congratulate Horie and colleagues because they belong to the interventional community looking for improvements in daily practice and providing data able to convince the community to adopt TRI more easily. TRI were largely perceived as an innovation in interventional cardiology more than two decades ago when Ferdinand Kiemeneij published his first trial, contributing greatly to popularising TRI⁸.

The adoption of an innovation in a human group always follows the same rules and has been especially analysed for marketing issues (Accelerating Diffusion of Innovation: Maloney's 16% Rule©. <https://innovateordie.com.au/2010/05/10/the-secret-to-accelerating-diffusion-of-innovation-the-16-rule-explained/>). Indeed, one needs creators to bring innovation to a specific field and, among them, visionaries who, as early adopters, will contribute to diffusing the

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innovation (the pioneers of TRI). Then, as with any paradigm shift in medicine, we get close to the tipping point of a major change where pragmatic individuals or the early majority requiring data and evidence-based medicine will bring the whole concept from a critical point of scarcity to social proof. Only after this increase and visible large adoption will the late majority as joiners and spectators follow and, in the end, also the reluctant individuals, sceptics and those who are highly conservative.

Compared to the femoral access, the radial access is associated with fewer complications at the vascular access site, better cost-effectiveness, more immediate ambulation, and increased post-procedural comfort for the patient. However, a significant learning curve must be acknowledged and, even after the learning curve has been passed, some infrequent procedural failures exist due to radial artery spasm or anatomical variations. The rare but existing risk of post-procedural RAO, even if asymptomatic, is perceived as a limitation for the radial access. In this context, the study of Horie et al tries to bring potential options to these limitations.

TRI have recently been associated with better hard clinical endpoints in high-volume centres, especially in STEMI patients, and should be a strong incentive for transitioning from femoral to radial access^{9,10}. In this context, there is no doubt that worldwide the last step of this paradigm shift will soon be achieved.

The next issue will not be to get TRI taught to all new interventional cardiologists but to maintain femoral access proficiency in the hands of all interventional cardiologists. Specific attention to femoral access should be emphasised, favouring arterial micro-puncture, echo-guided puncture or radioscopic anatomical landmark recognition to minimise the risk of vascular and deleterious bleeding complications.

More than two decades have been necessary to get the large majority of the interventional community to adopt TRI. We still need refinements in the technique and new materials (sheaths, catheters...) to increase the success rate in some challenging subgroups such as female patients, octogenarians, short stature individuals or when larger guiding catheters are requested. In this regard, the study of Horie and colleagues is interesting and there is no doubt that in some cases having this option in mind will be useful for some TRI.

Conflict of interest statement

The author has no conflicts of interest to declare.

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