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Access for percutaneous interventions: What is new in 2022?

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The optimal access for percutaneous coronary and structural interventions is an oft-discussed topic in interventional cardiology. While transradial access (TRA) is increasingly being adopted globally for coronary interventions,[1] there still remains indications for transfemoral access (TFA), particularly where large bore access is required.[2] For further downsizing of access, distal radial access (DRA) is being propagated, with increasing evidence accumulating for its feasibility and efficacy as a routine access site.[3]

Optimising indications and outcomes for each of the vascular access sites remains a well-researched topic, globally, with observational studies, randomised controlled trials (RCT) & meta-analyses related to vascular access being published in 2022, thirty years after the first transradial percutaneous coronary intervention (PCI) (Figure 1).[4]

While the reduction of bleeding and vascular access site complications by TRA has been well-established[5,6] in order to assess if these effects of TRA versus TFA are modified by patient or procedural characteristics, the Radial Trialists' Collaboration (RTC) undertook an updated individual patient-level data (IPD) meta-analysis in 2022.[7] This large IPD meta-analysis included data from seven multicentre RCTs published between January 1st 2005 and July 22nd 2021, comparing TRA vs. TFA for coronary angiography or PCI, which enrolled at least 100 PCI in each arm, and reported primary outcomes of all-cause mortality and major bleeding at 30 days.[7] Pooled data totalled 21,600 patients, 10,775 randomized to TRA and 10,825 to TFA, across the seven trials, i.e., COLOR, MATRIX, RIFLE STEACS, RIVAL, SAFARI-STEMI, SAFE-PCI for Women and STEMI-RADIAL trials. On intention-to-treat analysis, TRA was associated with significantly lower 30-day all-cause mortality [1.6% vs 2.1%; hazard ratio (HR) 0.77, 95% CI 0.63 – 0.95; p = 0.012], which was consistent in sensitivity analyses, including PCI, acute coronary syndromes and women.[7] Major bleeding, major adverse cardiac and cerebrovascular events (MACCE) and net adverse clinical events (NACE) were also significantly reduced with TRA, thus establishing the utility of TRA in reducing incidence of hard endpoints.[7]

Transradial access is universally recommended by both European and United States guidelines, especially in case of acute coronary syndromes (ACS).[8,9] The multicentre Turkish FORT CTO trial was the first randomised controlled trial (RCT) to further expand the comparison of TRA vs. TFA to CTO PCI, in terms of feasibility and outcomes. Although TRA and TFA demonstrated similar procedural success (84% vs 86%; P = 0.563) and MACEs, fewer access-site complications (2.0% vs 5.6%; P = 0.019) were seen with TRA than with TFA, with the caveat being that best practices for TFA puncture (ultrasound/ fluoroscopy guidance, micropuncture needles) were not applied, which

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might have led to more access-related complications in this arm.[10] This further fortifies randomised evidence from the COLOR trial published in 2021, where TRA compared to TFA had reduced access-site bleeding, without affecting procedural success in complex coronary lesions with large-bore access.[2]

Despite the far superior 60% reduced access site bleeding by TRA, TFA is still necessary for procedures requiring large bore access or occluded radials. The superiority and safety of transfemoral puncture with ultrasound-guided access has previously yielded mixed results in RCTs. The Routine Ultrasound Guidance for Vascular Access for Cardiac Procedures (UNIVERSAL) open-label randomised trial out of Canada, was designed to determine if routine ultrasound guidance for TFA reduced bleeding or vascular complications.[11] This trial found no difference in the primary composite endpoint of 30-day major bleeding or vascular complications with ultrasound-guided puncture (12.9% vs 16.1%, OR, 0.77 [95% CI, 0.49-1.20]; P = 0.25). Ultrasonography however, significantly improved first-pass success, reduced the number of arterial puncture attempts and venepuncture and showed a significant interaction with in-patients who received a closure device. In an updated meta-analysis of 9 RCTs including 4410 patients, published alongside the UNIVERSAL trial, ultrasound-guided TFA was associated with reduced major bleeding or major vascular complications.[11]

The Achilles' heel of TRA however, is radial artery occlusion (RAO), which precludes future use of the ipsilateral radial artery for further interventions.[12] The RIVARAD (Prevention of Radial Artery Occlusion With Rivaroxaban After Transradial Coronary Procedures) open-label multicentre RCT from Tunisia showed that rivaroxaban halved the risk of 30-day RAO, despite higher than usual rates of RAO (6.9% vs 13%, OR = 0.5, 95% CI = 0.27 – 0.91, p = 0.011), with no difference in bleeding vs placebo.[13] Patent haemostasis was not mandated by protocol and all patients received manual compression.

Distal radial access has been gaining increasing popularity especially in some parts of the world,[14] as an alternative to conventional TRA, with its improved procedure ergonomics and rationale for reducing forearm RAO. In the international, multicentre (Europe & Japan) DISCO RADIAL randomized controlled trial, DRA or TRA were compared in 1307 patients undergoing percutaneous coronary procedures using a 6-F Slender sheath.[15] With the systematic implementation of best practices for RAO reduction, including patent haemostasis, rates of forearm RAO were no different between TRA and DRA (0.91% vs 0.31%; p = 0.29), nor were bleeding and vascular access-related complications. DRA was associated with shorter haemostasis time, however, albeit more frequent spasm and crossover to TRA.[15]

An updated 2022 meta-analysis by Ferrante et al, of fourteen RCTs comparing DRA vs TRA found a 64% reduction in forearm RAO with DRA (RR: 0.36; 95 % CI: 0.23 to 0.56; P < 0.001) and 49% reduction of EASY ≥ II hematomas, with no difference in smaller local hematomas or spasm.[16] Perhaps reflecting anatomical location and learning curves, DRA, had higher time for puncture, sheath insertion, number of puncture attempts and access site crossover.[16] To further explore the safety of DRA, an international multicentre single-arm RATATOUILLE trial data provided useful observational evidence of the safety of DRA in terms of preserved motor and sensory hand function, as assessed by repeated systematic multidimensional subjective and objective assessments.[17] Similar to DISCO RADIAL, ultrasound-guided access was encouraged, but not mandated by protocol. Albeit observational, this study also reported remarkably low levels of RAO.[17]

DRA, by virtue of its anatomical location and puncture distal to the superficial palmar arch, maintains anterograde flow in the forearm radial artery, and provides an option for retrograde angioplasty of an occluded forearm radial artery.[14] Indeed, DRA was first described as a means of accessing and recanalizing the occluded proximal

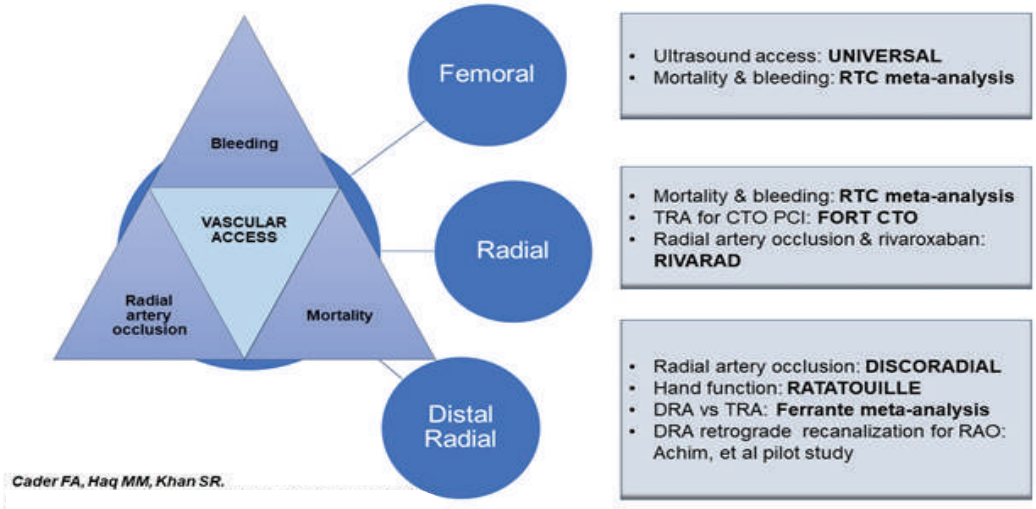

Figure 1: Access for percutaneous intervention: What is new in 2022?

radial artery segment.[18] The recently published 30-patient single arm pilot conducted by Achim et al, aimed at exploring the feasibility of recanalization of chronic RAO by DRA.[19] Successful recanalization was achieved in all case, with no major vascular complications, and only a single reported periprocedural stroke. Ninety percent of the recanalized radials remained patent at one-month follow-up. A similar study of retrograde recanalisation of RAO from China published a couple of months earlier however, was less encouraging, with a procedural success rate of 88.6%, and less frequent downstream patency of the radial artery, with rates of 48.7% and 43.6% at 3 and 6 months respectively.[20] Thus, as of now, there is no overwhelmingly convincing data that DRA is superior to TRA in terms of lower RAO rates or improved outcomes, aside from theoretical advantage of retaining the forearm TRA for future use.

Choice of vascular access varies according to type of procedure, indication for PCI, need for support/ancillary equipment, and patient characteristics or preference. Irrespective of the access used, the incorporation of up-to-date evidence-based practices in routine case is of paramount, to reduce complications, and improve patient outcomes.

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