

Deconstructing Perceived Barriers to Transradial Adoption

Can the transradial approach rise to become the preferred choice for percutaneous access in the United States?

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The use of transradial access was first described in the setting of diagnostic angiography in an article published in 1989.¹ Shortly thereafter, Ferdinand Kiemeneij, MD, PhD, performed the first transradial angioplasty procedure and described the rationale and technique for coronary stent implantation in a series of three patients.² In the ensuing 2+ decades, numerous clinical trials and studies have demonstrated the myriad benefits of the transradial approach for patients, providers, and the health care system in general.

Transradial access is widely used in Europe and Asia; however, adoption rates in the United States have hovered between 30% and 35%. It would seem plausible that, at a minimum, operators would view an alternative method for arterial access as another useful tool, with the overall goal of performing safe and effective interventional cases. However, multiple factors, which seem to be interrelated, may be contributing to low adoption rates compared with the rest of the world.

THE CASE FOR TRANSRADIAL

Published studies suggest numerous benefits of transradial intervention when compared with transfemoral intervention, including a 29% relative risk reduction in all-cause mortality, a 16% relative risk reduction in major adverse cardiovascular events, and a 77% reduction in major vascular complications.³ The risk of stroke after transradial intervention is comparable to that of transfemoral interventions,⁴⁻⁷ and the estimated incidence of hand ischemia is negligible.⁸ A recently noted and somewhat unexpected advantage

of the transradial approach in patients with acute coronary syndromes is a lower incidence of acute kidney injury as compared with transfemoral percutaneous coronary intervention (PCI).⁹ In fact, because of the favorable safety profile associated with the transradial approach, it is an ideal option for high-risk patients, such as obese individuals; patients with baseline anemia or those unable to accept blood products due to medical, personal, or religious preferences; patients with thrombocytopenia; or those with a high propensity for bleeding, peripheral artery disease, and perhaps even those with chronic kidney disease. Another important advantage is that use of transradial access does not mandate discontinuation of anticoagulation therapy, an increasingly common consideration given an aging population and the rapidly rising prevalence of atrial fibrillation.¹⁰

The transradial approach is also more patient friendly, with surveys demonstrating that patients have a strong preference versus transfemoral intervention.¹¹ However, advantages over the transfemoral approach are not limited to patient-oriented metrics. Transradial intervention performed by proficient operators is also associated with a similar or lower rate of radiation exposure compared with the transfemoral approach.^{12,13} Because transradial procedure times are typically shorter from start of procedure to completion of hemostasis, operators may realize greater institutional efficiency, as well as reduced staff burden because nurses are not tied up monitoring patients on extended bed rest.

In a retrospective analysis of the National Cardiovascular Data Registry, it was found that

patients undergoing transradial intervention typically have a shorter length of stay (2.5 days for transradial vs 3 days for transfemoral) and fewer bleeding events (1.1% vs 2.4%), factors that contribute to an average cost savings of \$830 per procedure. Interestingly, the procedural savings were graded and linked to the predicted bleeding risk of the patient with low-bleeding-risk patients saving \$642 per case, and high-bleeding-risk patients saving \$1,621 per case.¹⁴ Other analyses have reinforced the cost benefit of transradial intervention, including lower average direct hospital and postprocedure costs and a shorter length of hospital stay.¹⁵ Mitchell and colleagues reported that transradial costs \$275 less per patient from the hospital perspective, even after accounting for procedural variables such as operator learning curve, procedural time, and need for access site crossover.¹⁶

More recent estimates sourced from Medicare claims files place the per-patient cost savings significantly higher, in excess of \$900.¹⁷ From this analysis, it was suggested that wider adoption of the transradial approach by hospitals across the United States, paired with same-day discharge for a small proportion of patients after PCI, could save as much as \$300 million annually. In summary, these data suggest that transradial intervention represents the rare opportunity to improve patient outcomes and satisfaction while saving health care dollars.

PERCEIVED BARRIERS TO TRANSRADIAL ADOPTION

The aforementioned data present a strong case for the wider use of transradial access, and they are a significant factor why the European Society of Cardiology recommended transradial percutaneous intervention as the preferred approach for management of acute coronary syndrome without persistent ST-segment elevation.¹⁸ In light of this, it is difficult to reconcile why most United States–based interventional cardiologists do not follow the example of their European colleagues. Some popularly held beliefs about transradial access may help provide an explanation.

In its infancy, transradial access was largely thought to be exclusively useful for cases involving straightforward anatomy and for diagnostic procedures. Some advocates of transfemoral intervention still express this viewpoint today, under the presumption that femoral access is much more adaptable in the face of unexpected and difficult anatomy. Yet, such thinking ignores the fact that continued innovations in the transradial space have yielded techniques for tackling

even the most complex anatomic and procedural challenges. Moreover, detractors of transradial access who cite late radial complications after successful PCI as a reason to limit radial use should note that standard solutions and “best practices” now exist for avoiding and managing transradial complications, such as late radial artery occlusion¹⁹ and postcatheterization radial artery pseudoaneurysm.²⁰ Ongoing work in the field suggests the plausibility of distal arterial access as an alternate (and perhaps an improvement on) standard radial access. Thus, all data point to the fact that although the transradial approach is suitable for straightforward cases, it is also much more widely applicable than currently utilized.

Rejecting the transradial approach based on the need to be prepared for complex anatomy or because transfemoral appears better suited for ad hoc interventions is in part related to another popular misconception about radial access. Many interventional cardiologists perceive that starting with transradial access involves a steep learning curve and/or that there are insufficient opportunities to become more proficient in the nuances of the approach. In truth, radial access/approach techniques have not historically been taught in most fellowship training programs, but neither does formal training constitute the sum total of learning opportunities for medical professionals. Quite to the contrary, there are a number of excellent transradial simulators on the market today, and a number of industry sources sponsor training courses, both independently and in conjunction with major medical meetings. As matter of full disclosure, I am the course director of an educational series called ThinkRadial that is sponsored by Merit Medical, which recently launched a series of advanced training seminars. It is hoped that educational offerings such as these will communicate the finer points of transradial access to the broader community of interventional operators in the United States, and in doing so, will dispel any lingering myths about the technique and advance the dialogue regarding the relative benefits of various access sites.

The importance of industry support for the transradial approach should not be overlooked for another reason. There was a time when those interested in accessing the radial artery had to adapt equipment manufactured for femoral access. That is no longer the case, and the modern interventional cardiologist has all the tools necessary at his or her disposal to competently and ably use radial access in just about any setting that would be handled by femoral access—again, not just for routine cases.

AN OPTIMISTIC OUTLOOK

What seems to permeate under the surface of all of the perceived barriers to adopting transradial access is a knowledge gap. If that is true, then perhaps the most significant barrier to wider adoption is staring us all in the face. A natural precursor to the evolution of any technique used in medicine is a willingness to examine and question the status quo; if that process reveals areas where improvements can be made, then the next step is to consider what other available options might improve outcomes. Implied within this reasoning is an unwillingness to merely accept that we have reached the extent of our capabilities.

Adopting transradial access as a new user does require careful forethought and planning. There is an initial cost to set up the lab and in staff training; also, case times are often longer during the learning phase, but over time, these issues are mitigated as the operator becomes more familiar with the techniques and nuances. Fundamentally, for the motivated operator, adopting transradial access is akin to any other clinical addition in that the initial phase of discomfort is more than likely to decrease as time goes on.

A few years ago, the outlook for transradial intervention in the United States was not entirely positive. However, a review of the National Cardiovascular Data Registry database suggests that approximately one in three cases is performed via a radial approach, suggesting a slow but steady willingness by interventional cardiologists to adopt a different technique. Although registry data are always subject to limitations, there is potential for that number to increase to > 50% in the coming years.

One reason for the ascendancy of transradial intervention is that younger members of our field seem to be enthusiastic about learning different techniques for percutaneous procedures. My reasoning for this is purely anecdotal; however, I have noted year after year that the trainees who come out of our institution primarily utilize transradial access in their own practices. Informal surveys reflect a very similar situation taking hold in other training programs across the United States. While I would not guess that adoption rates will reach or surpass those of our European and Asian colleagues anytime soon, the growing tide of younger operators performing transradial interventions supplies rationale for being cautiously optimistic that transradial will rise to a level of being more than “just another option for percutaneous intervention” in the very near future. ■

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