

Current Practices in Korea: Coronary Angiography and Intervention Using Radial Access

Han Saem Jeong, MD, and Soon Jun Hong, MD

Department of Cardiology, Cardiovascular Center, Korea University Anam Hospital, Seoul, Korea

Refer to the page 457-468

Transradial coronary angiogram was initially attempted with 8-10 F catheter in 1948,¹⁾ and transradial stent implantation was successfully performed in 1993.²⁾ Transradial access (TRA) became widely used, and the proportion of radial approach during percutaneous coronary intervention (PCI) increased from 1.18% in 2007 to 16.07% in 2012.³⁾ The transfemoral approach (TFA) has been widely used because of the huge arterial accessibility, with added advantages of reduced procedure time, catheter selection without major restrictions on the thickness, and faster learning of procedure as compared with the TRA. However, TFA was significantly associated with vascular complications, such as increasing transfusion rate, retroperitoneal hemorrhage, morbidities, and mortality.⁴⁾⁵⁾ Several studies which compared TRA with TFA demonstrated that transradial coronary angiography and angioplasty are safe, feasible, and effective with similar results, if not superior, to those of the TFA.⁶⁻⁸⁾ In contrast to the TFA, the rate of major vascular complications was negligible using the TRA.⁹⁾ Meta-analysis comparing TRA with TFA showed a major reduction in complications associated with bleeding when compared with TFA,

and a major reduction in transfusion rates as well as improved outcome of death or myocardial infarction.¹⁰⁾¹¹⁾ However, TRA had some complications which include radial artery perforation, evulsion, pseudoaneurysm formation, non-occlusive radial artery injury, radial artery occlusion, and higher procedural duration and radiation exposure.¹²⁾ Many countries and races have reported a trend towards TRA, but there is only limited information regarding these trends in the Korean population.

Youn et al.¹³⁾ have reported a large prospective registry showing the current practice of coronary angiogram (CAG) and PCI using radial access in Korea. Also, in this issue of the Korean Circulation Journal, they have summarized the current practice of CAG and PCI using radial access. As per the Korean Transradial Intervention Prospective Registry, this study¹³⁾ showed that TRA was 82.4% in the initial access site for PCI, which was a surprising number when compared with only 16.1% for TRA PCI in the United States in 2012.³⁾ Although the adoption of TRA has rapidly increased, some centers still prefer TFA especially during primary PCI, because not all centers and operators in Korea are specialized for radial procedures. Considering this, the value of 82.4% could be interpreted to reflect an over-estimated value rather than the actual percentage in Korea, since 20 participating centers in this registry have been performing TRA for many years and have a high volume of TRA PCI. It is the limitation of this study that the TRA data conducted only by high volume centers may not be completely extrapolated to all PCI centers in Korea. The rate of access site crossover, bleeding, and major vascular complications in overall subjects, was similar with other major studies.⁷⁾⁸⁾¹⁴⁾ TRA needed a learning curve for the proficiency and training for specific skills. The fact that the rate of access site crossover increased to 8.1% of the subjects undergoing PCI and decreased to 4.8% of the subjects undergoing primary PCI, reflected that TRA needed experience and confidence for TRA PCI. When TRA failed, crossover to TFA required additional cost, patient inconvenience, longer procedural time, and reperfusion delays. The radial-to-femoral crossover rate of TRA in primary PCI, from the

Received: September 9, 2015

Revision Received: September 27, 2015

Accepted: October 2, 2015

Correspondence: Soon Jun Hong, MD, Department of Cardiology, Cardiovascular Center, Korea University Anam Hospital, 73, Incheon-ro, Seongbuk-gu, Seoul 02841, Korea

Tel: 82-2-920-5445, Fax: 82-2-927-1478

E-mail: psyche94@gmail.com

• The authors have no financial conflicts of interest.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

study of radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL), was 7%.⁸⁾ A reasonable recommendation is that interventional cardiologists should not start performing transradial primary PCI until their procedure success rates are comparable between their elective radial and femoral PCI procedures, and their radial-to-femoral crossover rate is $\leq 7\%$. Considering this, a crossover rate of 4.8% in this study was an outstanding result compared to the RIVAL study. Moreover, in this study,¹³⁾ the rate of bleeding after primary PCI was lower than that of the RIVAL study, and the rate of major vascular complications was also very low. Considering the low complication rates, primary PCI was safely and reasonably performed via TRA in 20 participating centers in Korea. Furthermore, for patients with acute coronary syndrome in the Minimizing Adverse Haemorrhagic Events by Transradial Access Site and Systemic Implementation of Angiox (MATRIX) study, TRA PCI not only reduced bleeding, but also reduced mortality.⁷⁾ However, we need to keep in mind that experienced interventional cardiologists who performed at least 75 TRA PCI within the past year, and who performed more than 50% of their PCI via radial artery, participated in the MATRIX trial.⁷⁾

It is clear from the available evidence that radial access CAG and PCI not only improve clinical outcomes and reduce cost, but also have no adverse effects on arm or hand functions. These data will provide evidence for achieving consensus on radial access CAG and PCI in the Korean population, and will encourage radial access to be the default strategy for PCI.

References

1. Radner S. Thoracic aortography by catheterization from the radial artery; preliminary report of a new technique. *Acta radiol* 1948;29:178-80.
2. Kiemeneij F, Laarman GJ. Percutaneous transradial artery approach for coronary stent implantation. *Cathet Cardiovasc Diagn* 1993;30:173-8.
3. Feldman DN, Swaminathan RV, Kaltenbach LA, et al. Adoption of radial access and comparison of outcomes to femoral access in percutaneous coronary intervention: an updated report from the national cardiovascular data registry (2007-2012). *Circulation* 2013;127:2295-306.
4. Brueck M, Bandorski D, Kramer W, Wiecek M, Höltingen R, Tillmanns H. A randomized comparison of transradial versus transfemoral approach for coronary angiography and angioplasty. *JACC Cardiovasc Interv* 2009;2:1047-54.
5. Chase AJ, Fretz EB, Warburton WP, et al. Association of the arterial access site at angioplasty with transfusion and mortality: the M.O.R.T.A.L study (Mortality benefit Of Reduced Transfusion after percutaneous coronary intervention via the Arm or Leg). *Heart* 2008;94:1019-25.
6. Sciahbasi A, Pristipino C, Ambrosio G, et al. Arterial access-site-related outcomes of patients undergoing invasive coronary procedures for acute coronary syndromes (from the ComPaRison of Early Invasive and Conservative Treatment in Patients With Non-ST-Elevation Acute Coronary Syndromes [PRESTO-ACS] Vascular Substudy). *Am J Cardiol* 2009;103:796-800.
7. Valgimigli M, Gagnor A, Calabró P, et al. Radial versus femoral access in patients with acute coronary syndromes undergoing invasive management: a randomised multicentre trial. *Lancet* 2015;385:2465-76.
8. Jolly SS, Yusuf S, Cairns J, et al. Radial versus femoral access for coronary angiography and intervention in patients with acute coronary syndromes (RIVAL): a randomised, parallel group, multicentre trial. *Lancet* 2011;377:1409-20.
9. Jolly SS, Amlani S, Hamon M, Yusuf S, Mehta SR. Radial versus femoral access for coronary angiography or intervention and the impact on major bleeding and ischemic events: a systematic review and meta-analysis of randomized trials. *Am Heart J* 2009;157:132-40.
10. Bertrand OF, Bélisle P, Joyal D, et al. Comparison of transradial and femoral approaches for percutaneous coronary interventions: a systematic review and hierarchical Bayesian meta-analysis. *Am Heart J* 2012;163:632-48.
11. Agostoni P, Biondi-Zoccai GG, de Benedictis ML, et al. Radial versus femoral approach for percutaneous coronary diagnostic and interventional procedures; systematic overview and meta-analysis of randomized trials. *J Am Coll Cardiol* 2004;44:349-56.
12. Rao SV, Bernat I, Bertrand OF. Clinical update: remaining challenges and opportunities for improvement in percutaneous transradial coronary procedures. *Eur Heart J* 2012;33:2521-6.
13. Youn YJ, Lee JW, Ahn SG, et al. Current practice of transradial coronary angiography and intervention: results from the Korean transradial intervention prospective registry. *Korean Circ J* 2015;45:457-68.
14. Burzotta F, Trani C, Mazzari MA, et al. Vascular complications and access crossover in 10,676 transradial percutaneous coronary procedures. *Am Heart J* 2012;163:230-8.