

Editorial



Dose Coronary Angiography Suffice for Assessment of Intermediate Coronary Stenosis?

Sung Gyun Ahn , MD, PhD*, and Sang Jun Lee , MD*

Department of Internal Medicine, Wonju Severance Christian Hospital, Yonsei University Wonju College of Medicine, Wonju, Korea

OPEN ACCESS

Received: Jul 13, 2019
Accepted: Jul 16, 2019

Correspondence to

Sung Gyun Ahn, MD, PhD



Division of Cardiology, Department of Internal Medicine, Wonju Severance Christian Hospital, Yonsei University Wonju College of Medicine, 20, Ilsan-ro, Wonju 26426, Korea.
E-mail: sgahn@yonsei.ac.kr

*Sung Gyun Ahn and Sang Jun Lee contributed equally to this work.

Copyright © 2019. The Korean Society of Cardiology

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Sung Gyun Ahn 
<https://orcid.org/0000-0002-1528-2739>
Sang Jun Lee 
<https://orcid.org/0000-0002-0490-6657>

Conflict of Interest

The authors have no financial conflicts of interest.

Author Contributions

Writing - original draft: Ahn SG, Lee SJ; Writing - review & editing: Ahn SG, Lee SJ.

► See the article “The Current Status of Intervention for Intermediate Coronary Stenosis in the Korean Percutaneous Coronary Intervention (K-PCI) Registry” in volume 49 on page 1022.

Intermediate coronary stenosis on angiography is mostly defined by the diameter stenosis of 40% to 70%.¹⁾ Coronary angiography commonly fails to identify the real hemodynamic significance of intermediate coronary stenosis as it has the fundamental drawbacks of being a luminogram. This brings on frequent over- or underestimation of stenosis severity due to the eccentricity of atheroma and vascular remodeling with significant intra- and inter-observer variability of visual estimation. Moreover, only a small number of patients in the catheterization laboratory have a noninvasive myocardial ischemia test before coronary angiography.²⁾ For these reasons, intermediate coronary stenosis on angiography remained a therapeutic dilemma for cardiologists.

Fortunately, in the past 2 decades, the use of intracoronary physiological index such as fractional flow reserve (FFR) has been expanded to complement the diagnostic capability of coronary angiography.^{3,4)} Indeed, FFR can recategorize approximately half of intermediate lesions, defined by 50–70% luminal stenosis into hemodynamically insignificant ones with FFR >0.80.⁵⁾ Whether moderately stenotic lesions can induce myocardial ischemia is determined by a complex interplay among coronary flow velocity, degree of stenosis, plaque characteristics, and microvascular function.⁶⁾ Determinants for positive FFR in intermediate lesions include age, their location, their subtended myocardial mass, the presence of concomitant proximal or distal stenoses, diffuseness of atheroma, the presence of high-risk plaque features, or microvascular integrity.^{5,7)} Thus, adjunctive physiological assessment for intermediate coronary stenosis is requisite in decision making for percutaneous coronary intervention (PCI) given that the long-term efficacy and safety of physiology-guided deferred PCI or revascularization strategy have been established from multiple randomized controlled trials.^{3,4)}

In this issue of the *Korean Circulation Journal*, Kim *et al.*⁸⁾ raised critical issues regarding the underutilization of physiology in PCI for intermediate coronary stenosis. From a nationwide, standardized database for PCI case analysis of 92 hospitals,^{2,9)} the authors reported that an overall rate of physiology-guided PCI for intermediate lesions is remarkably low, up to 11.5%. The impediments to higher FFR performance in PCI for intermediate lesions vary, including a lack of facilities for FFR measurement, the entrenched oculostenotic reflex of treating physicians, additional medical cost, and technical issues such as hyperemic agents. Most importantly, as the authors stated in the article, limited reimbursements by National

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

Health Insurance for FFR measurement hamper its widespread use in PCI for intermediate coronary stenosis. Weaknesses of this article include potential underreported FFR use due to selective participating institutes, a lack of information on the rate of FFR-guided deferred PCI for intermediate lesions, and a lack of noninvasive correlative studies. Notwithstanding, this kind of real-world data registries could fill the gap between randomized control trials and our daily practice.⁹⁾¹⁰⁾ Additionally, this real-world evidence would be the cornerstone for future research, improvement of physicians' practice pattern, and national healthcare policy amendment.⁹⁾

Coronary angiography alone is not sufficient for the proper assessment of intermediate coronary stenosis. Noninvasive coronary computed tomography angiography, and intracoronary imaging modalities such as intravascular ultrasound, optical coherence tomography or intravascular near-infrared spectroscopy may help recognize event-prone high-risk nonobstructive plaque.⁷⁾ Intermediate coronary stenosis is likely the most needed but underused for intracoronary imaging and physiology. Their judicious integration into our everyday practice in the catheterization laboratory would help us provide evidence-based best medical care for patients with intermediate coronary stenosis.

REFERENCES

1. Tobis J, Azarbal B, Slavin L. Assessment of intermediate severity coronary lesions in the catheterization laboratory. *J Am Coll Cardiol* 2007;49:839-48.
[PUBMED](#) | [CROSSREF](#)
2. Jang JS, Han KR, Moon KW, et al. The current status of percutaneous coronary intervention in Korea: based on year 2014 cohort of Korean percutaneous coronary intervention (K-PCI) registry. *Korean Circ J* 2017;47:328-40.
[PUBMED](#) | [CROSSREF](#)
3. Zimmermann FM, Ferrara A, Johnson NP, et al. Deferral vs. performance of percutaneous coronary intervention of functionally non-significant coronary stenosis: 15-year follow-up of the DEFER trial. *Eur Heart J* 2015;36:3182-8.
[PUBMED](#) | [CROSSREF](#)
4. Xaplanteris P, Fournier S, Pijls NH, et al. Five-year outcomes with PCI guided by fractional flow reserve. *N Engl J Med* 2018;379:250-9.
[PUBMED](#) | [CROSSREF](#)
5. Park SJ, Kang SJ, Ahn JM, et al. Visual-functional mismatch between coronary angiography and fractional flow reserve. *JACC Cardiovasc Interv* 2012;5:1029-36.
[PUBMED](#) | [CROSSREF](#)
6. Ahn SG, Suh J, Hung OY, et al. Discordance between fractional flow reserve and coronary flow reserve: insights from intracoronary imaging and physiological assessment. *JACC Cardiovasc Interv* 2017;10:999-1007.
[PUBMED](#) | [CROSSREF](#)
7. Lee JM, Choi KH, Koo BK, et al. Prognostic implications of plaque characteristics and stenosis severity in patients with coronary artery disease. *J Am Coll Cardiol* 2019;73:2413-24.
[PUBMED](#) | [CROSSREF](#)
8. Kim JH, Choi W, Kim KC, et al. The current status of intervention for intermediate coronary stenosis in the Korean percutaneous coronary intervention (K-PCI) registry. *Korean Circ J* 2019;49:1022-32.
[PUBMED](#) | [CROSSREF](#)
9. Gwon HC, Jeon DW, Kang HJ, et al. The practice pattern of percutaneous coronary intervention in Korea: based on year 2014 cohort of Korean percutaneous coronary intervention (K-PCI) registry. *Korean Circ J* 2017;47:320-7.
[PUBMED](#) | [CROSSREF](#)
10. Ahn SG, Lee JW, Youn YJ, et al. In-hospital outcome differences between transradial and transfemoral coronary approaches: data from the Korean percutaneous coronary intervention registry. *Catheter Cardiovasc Interv*. 2019 [Epub ahead of print].
[PUBMED](#) | [CROSSREF](#)