

Editorial



Stent Selection in Complex Coronary Interventions: Thinking Complex?

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Conflict of Interest

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► See the article "Safety and Efficacy of Biodegradable Polymer-biolimus-eluting Stents (BP-BES) Compared with Durable Polymer-everolimus-eluting Stents (DP-EES) in Patients Undergoing Complex Percutaneous Coronary Intervention" in volume 49 on page 69.

Over the past two decades, percutaneous coronary intervention (PCI) has rapidly evolved to be the mainstream therapy for revascularization in patients with coronary artery disease. Although many important milestones have been achieved, such as improved device technology, implementation of intravascular imaging for lesion selection or stent optimization, and greater understanding of drug-device interactions, the development of the drug-eluting stent (DES) has arguably been pivotal to this transformation.¹⁾ Ongoing advances in DES technology and engineering have resulted in the advent of a new generation of DESs that use antiproliferative agents with improved drug release kinetics, novel stent materials, more flexible and thinner strut platforms, and biocompatible or biodegradable polymers that offer important advantages over their first-generation counterparts. Numerous large-scale randomized trials comparing the available DESs have demonstrated excellent and reproducible long-term outcomes. As a result, contemporary DESs are generally regarded as a mature technology and have become the default PCI device for a broad range of clinical and anatomical subsets.²⁾ Against this background, stent-based treatment has dramatically expanded its role into coronary artery lesions that have high-risk and complex features. Although a uniformly adopted consensus defining a complex PCI is lacking, anatomical features that can influence the degree of difficulty associated with PCI include true bifurcation/trifurcation disease, diffuse or multivessel disease, stenosis of tortuous vessels, chronic total occlusion, undilatable lesions accompanied by heavy calcification, and thrombotic lesions.³⁾ The increasing age of the general population means that PCI candidates are more frequently anticipated to have such complex coronary anatomy. Indeed, the majority of patients with these challenging subsets of lesions are now successfully treated in the cardiac catheterization laboratory with the use of contemporary materials and techniques. However, following technical success, these patients remain at increased risk of mid- to long-term adverse ischemic events, including stent-related thrombotic complications.⁴⁾ Intuitively, it may be anticipated that some stents perform better than others when complex procedural features are considered. However, limited data are available as complex PCI settings have historically been under-represented in clinical trials and registries.

In this issue of the *Korean Circulation Journal*, a well-conducted study presented by Song et al.⁵⁾ focuses attention on this issue. Using a prospective multicenter registry from Korea,

the authors investigated the clinical outcomes of biodegradable polymer biolimus-eluting Biomatrix stent (BP-BES) compared with durable polymer everolimus-eluting Xience stent (DP-EES) in patients undergoing complex PCI. During 2-year follow-up of 481 propensity score-matched patients, the incidence of the device-oriented composite endpoint (target-lesion failure, 3.8% vs. 5.2%, $p=0.21$) as well as its individual components did not differ between the 2 stent groups. Although this analysis provides data supporting the safety and efficacy of BP-BES for complex PCI, these data must be interpreted with caution. As the authors highlight, the definition adopted for complex PCI in this study appears to be less realistic. Arbitrary criteria, such as left main trunk as the target vessel or bifurcation as the target lesion, were included without any procedural information regarding the type of stenting technique that was actually applied. Although the definition of complex PCI in this study is similar to that pre-specified in the Dual Antiplatelet Therapy trial,⁶ it is less stringent than the definition adopted in the recent European Society of Cardiology guidelines for the measurement of prolonged dual-antiplatelet therapy (i.e., at least 3 stents implanted, at least 3 lesions treated, bifurcation with 2 stents implanted, total stent length >60 mm). Accordingly, the prevalence of complex PCI in a prior pooled patient-level study of data from 6 randomized trials was 17.5%, which is far lower than in the current real-world registry (57.3%).⁷ Another concern is related to the stent type evaluated in this study. Biodegradable polymer stents were derived from the fact that polymers can act as a substrate for neoatherosclerosis and late stent thrombosis.⁸ BP-BES has a relatively thick strut (120 μm) and is coated with a poly-lactic acid polymer, which is co-released with highly lipophilic biolimus during 6–9 months. Therefore, differences in performance between the BP-BES and DP-EES could be anticipated during long-term follow-up, which is evidenced by the results of the LEADERS trial.^{9,10} A 2-year follow-up period is perhaps not sufficient to identify differential advantages related to the biodegradable polymer and disadvantages related to the thick strut that is used in BP-BES.

Complex coronary lesions remain a challenge in contemporary PCI. Because a number of studies have demonstrated that both durable- and biodegradable-polymer DESs are equally safe and effective, optimal stenting technique regardless of stent type has been emphasized for treatment success. However, each anatomical or procedural characteristic involved in a complex PCI may require a preferred feature of commercial DESs that influences the flexibility, scaffolding, drug distribution, radial support, or thromboresistance. Although it may be difficult to demonstrate differences among various stent platforms, even in complex PCIs, considering the very low event rate of modern second-generation DESs described in numerous clinical trials and registries, Song et al.⁵ have made an important step forward in this subject. While we await the availability of additional evidence, the operator's experience and familiarity with a given platform for a specific anatomy and the chosen technique should be prioritized during stent selection in this clinical situation.

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