The introduction of the bare metal stent (BMS) dramatically altered the treatment of ischemic heart disease. However, it was not without its flaws. After a BMS implantation, the vascular response was observed to manifest in 2 ways; namely, an in-stent segment response and an edge vascular response. The definition of the edge vascular response (Figure) is a reduction in the lumen area mainly because of an increase in plaque/media and lumen area within the first 1–2 mm of the device. Even though an excessive edge vascular response requires repeat target revascularization, stent failure in such circumstances was not common in the BMS era.

In the drug-eluting stent (DES) era, the E-SIRIUS trial showed that a less traumatic implantation technique with a sirolimus-eluting stent (SES) led to favorable outcomes as a result of less intimal hyperplasia. The IVUS substudy of the E-SIRIUS trial revealed that no significant lumen loss was observed at either of the stent edges. These results emphasized the importance of technical factors on the occurrence of the edge vascular response, introducing the concept of “geographical miss”, which consists of an axial miss that results in in-stent lesions and a longitudinal miss that could lead to edge lesions. The longitudinal miss is thought to be mainly caused by technical failure, whereas axial miss is often recognized as a strategic error. In the STLLR trial, longitudinal miss was defined as an injured or diseased segment not covered by the SES, and axial miss as balloon-artery size ratio <0.9 or >1.3.

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Department of Cardiovascular Medicine, Wakayama Medical University, Wakayama, Japan

Mailing address: Atsushi Tanaka, MD, PhD, Department of Cardiovascular Medicine, Wakayama Medical University, 811-1 Kimiidera, Wakayama 641-8509, Japan. E-mail: a-tanaka@wakayama-med.ac.jp

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The results of the STLLR trial were unexpected because geographical miss was found in 66.5% of the patients, primarily as longitudinal miss (47.6%), and associated with increased risk of target vessel revascularization mostly at the stent edge.3 In addition to geographical miss, a recent study reported that mechanical properties at the DES edge could also contribute to edge restenosis.5

Although the rigidity of a metallic scaffold eliminates recoil of the vessel wall, it also potentially restricts vascular pulsatility and distensibility throughout the patient’s life, leading to edge restenosis. The rigidity of a metallic scaffold is likened to a double-edged sword. Fast forward to the present day and an everolimus-eluting bioreabsorbable vascular scaffold (BVS) is now available in the clinical setting, which raises a key question: what will happen at the edge of these transient scaffolds?

In this issue of the Journal, Tateishi et al7 present their work on the edge vascular response after resorption of the everolimus-eluting BVS. They answer the key question in addition to their published 2 years of data using the same cohort.3 According to their findings, in the first 12 months following device implantation, there is a significant reduction in the lumen of the scaffold, while in the following 48 months no significant change was demonstrated. The scaffold segment and the lumen area in the transitional region no longer change after the first year of follow-up and the lumen contour of the edges become aligned with the contour of the scaffold after 1 year. The edge vascular response seems to have disappeared together with resorption of the scaffold.

This study also suggests the efficacy of optical coherence tomography (OCT) for BVS assessment. Until the introduction of OCT,9 intravascular ultrasound (IVUS) was the main tool for assessing the vascular response after stent implantation.10 However, apart from its low resolution, the slow pull-back speed of IVUS (0.5 mm/s) introduces motion artifact that makes it hard to identify the true device edge in the longitudinal direction, which potentially could be the confounding factor in assessing the edge vascular response in the IVUS era. Fast pullback OCT with high resolution could potentially overcome this limitation.

The 5-year intravascular OCT follow-up data with different time points is the longest available in the published literature. At the same time, other important questions remain. An experimental study reported that coronary vasoconstriction to serotonin was significantly enhanced at the edge of DES with a durable polymer.10 Even though the authors showed that morphological lumen continuity was restored along with scaffold absorption, the recovery of physiological vascular function at the device edge remains unclear. The study included a small number of patients with very specific target lesions and vascular response might be influenced by the lesion or patients’ characteristics.11

Clinical implications of the edge vascular response to BVS may be dependent on the clinical significance of BVS. Although PCI using BVS could become slightly complicated because of the nature of struts, BVS may offer several potential advantages over DES, including no need for dual antiplatelet therapy, lower incidence of late catch-up, restored conformability, normalization of shear stress, stabilization of plaque by plaque sealing, and protection of major branches. These advantages would encourage widespread use of BVS in daily practice. However, the European multicentre GHOST-EU registry aimed to investigate the outcome of BVS in routine clinical practice and the “real-world” showed acceptable rates of target lesion failure at 6 months; however, the rates of early and midterm scaffold thrombosis, mostly clustered within 30 days, were not negligible.12

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