ESC European Society of Cardiology

European Heart Journal - Case Reports (2021) **5**(9), 1–3
doi:10.1093/ehjcr/ytab370

In-stent restenosis due to delayed healing of abluminal bioresorbable polymer everolimus-eluting stent: insight from histopathological evaluation with directional coronary atherectomy

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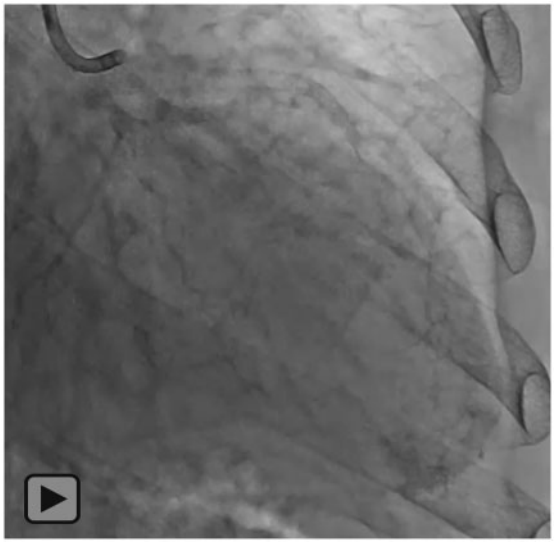
Received 12 July 2021; first decision 17 August 2021; accepted 3 September 2021; online publish-ahead-of-print 15 September 2021

A 57-year-old man with a history of diabetes, who underwent percutaneous coronary intervention with an abluminal bioresorbable polymer (BP)-everolimus-eluting stent (BP-EES) (SYNERGY XD, Boston Scientific, MN, USA) in the proximal left anterior descending artery (LAD) 15 months before, presented with unstable angina. Coronary angiogram showed in-stent restenosis (ISR) of the BP-EES. A huge consecutive plaque from the proximal LAD to ISR lesion was resected via directional coronary atherectomy (DCA), and subsequent drug-coated balloon (DCB) angioplasty was performed, because DCA followed by DCB is reportedly effective for proximal LAD lesions (*Figure 1A–D* and *Video 1*).[1] Optical coherence tomography (OCT) revealed a heterogenous neointimal proliferation with a peri-strut low-intensity area in the ISR (*Figure 1E* and *Video 2*). The final OCT revealed that the ISR neointima and proximal LAD plaque were optimally resected by DCA (*Video 3*); however, the resected sample included EES struts (*Figure 1F*). Histopathological evaluation of the haematoxylin–eosin-stained sample confirmed the accumulation of lymphocytes in the neointima and on the abluminal side of the peri-strut, suggestive of delayed healing due to an abnormal reaction to BP-EES (*Figure 1G*).

BP-EES is a thin-strut platinum–chromium stent with an ultrathin BP (poly-lactic-co-glycolic acid) that reduces inflammation and facilitates vascular healing by absorption of the hydrolyzed polymer within ∼4 months and can provide good clinical outcomes.[2] Lymphocytic accumulation in neointima is indicative of inflammation and delayed healing. Potential risks of delayed healing of drug-eluting stents



Video 1 Initial and final coronary angiogram.

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Handling Editor: Dimitrios A Vrachatis
Peer-reviewers: Elad Asher; Callum Little and Andrew Peter Vanezis

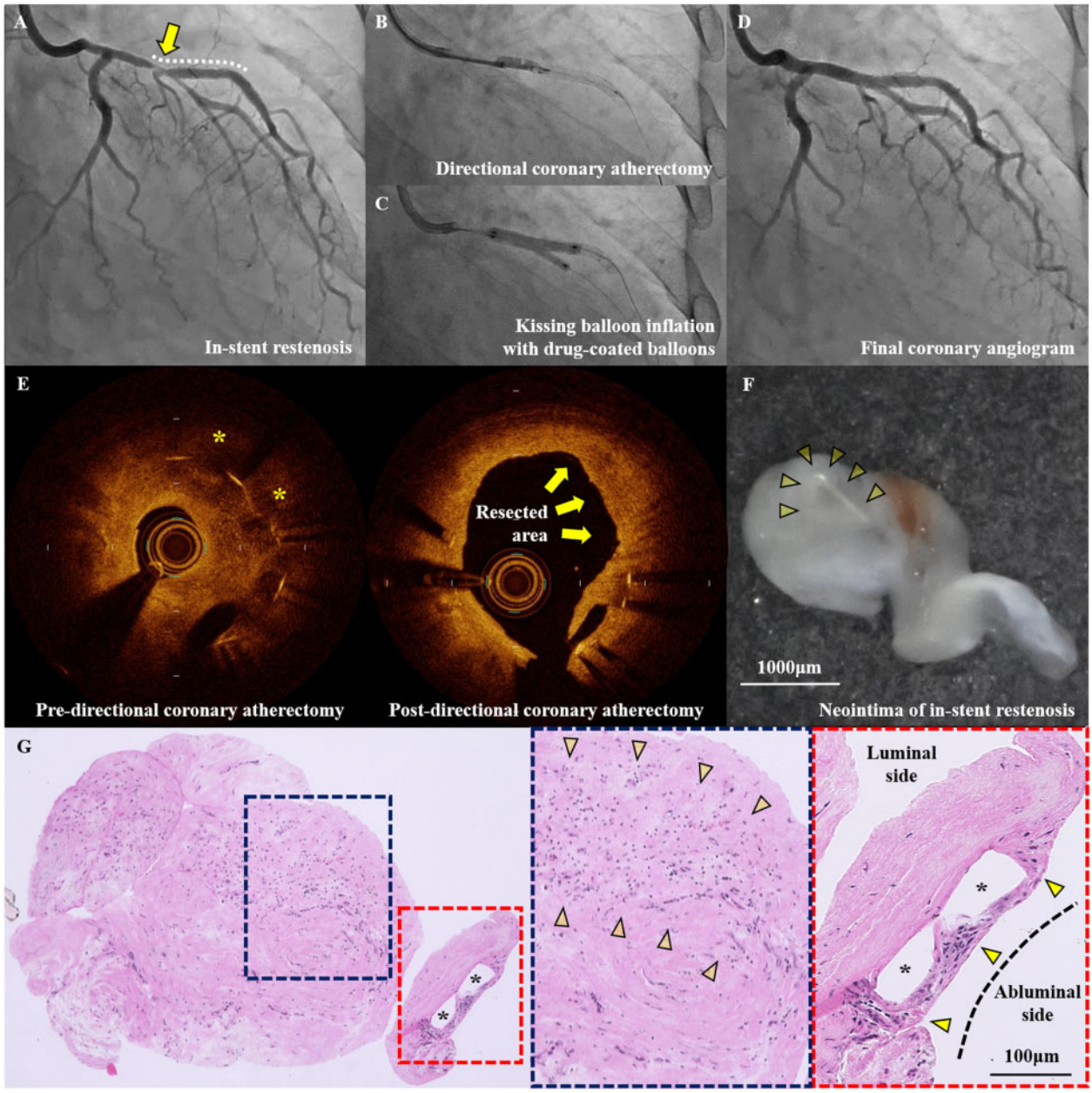


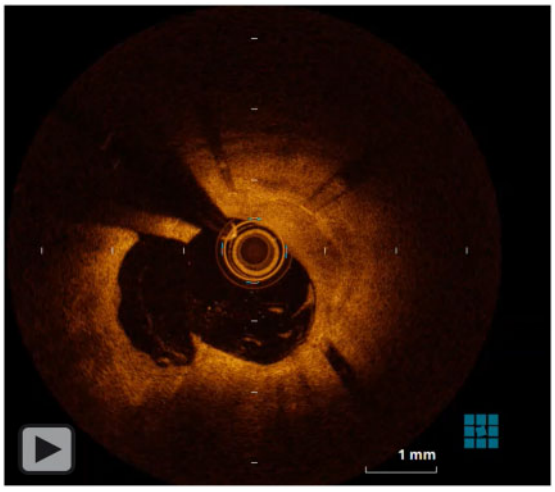
Figure 1 (*A–D*) Coronary angiogram of (*A*) initial, (*B*) directional coronary atherectomy, (*C*) drug-coated balloon angioplasty, and (*D*) final. (*E*) Comparison of optical coherence tomography imaging pre-directional coronary atherectomy and post-directional coronary atherectomy (yellow asterisks: peri-strut low-intensity area). (*F*) Macroscopic findings of neointima including stent-struts obtained by directional coronary atherectomy (arrowheads indicate the stent-strut). (*G*) Haematoxylin–eosin staining of low-power image (left) and high-power image (right) showing lymphocytic accumulation (arrowheads), which was observed especially in the abluminal side of stent-strut (asterisks).

include hypersensitive reaction to the stent material, drug, or BP.[3] In this case, localized lymphocytic accumulation in the abluminal side of the ISR stent-strut suggests an abnormal reaction to the BP-EES potentially induced by polymer residue. To our knowledge, this histopathologically evaluated *in vivo* case represents the first report of delayed healing after BP insertion leading to neointimal proliferation and ISR of the BP-EES.

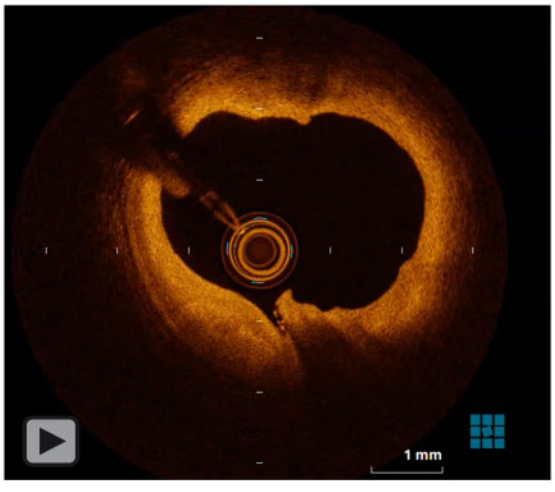
IRB information: Approved by the review board of our institution (Reference-number: 02-29).

Consent: The author confirm that written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: None declared.



Video 2 Initial optical coherence tomography.



Video 3 Optical coherence tomography post-directional coronary atherectomy.

Funding: None declared.

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