



Clinical Case Report

Histopathological heterogeneity of in-stent restenosis in four coronary endarterectomy specimens



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ABSTRACT

Here, we histopathologically compare four patients undergoing coronary artery bypass with coronary endarterectomy and onlay patch grafting for in-stent restenosis (ISR) after the implantation of a bare-metal stent (BMS), sirolimus-eluting stent (SES), or paclitaxel-eluting stent (PES) in an everolimus-eluting stent (EES). Heterogeneity of ISR was noted histopathologically. In ISR for BMS, restenosis is likely caused by so-called neoatherosclerosis that occurred which altered the healing process of BMS implantation. Two ISR cases for SES showed a histopathological heterogeneity: one showed nodular calcified thrombus around stent strut protruding into the lumen, and the other showed concentric neointima composed of CD68-positive foam cell proliferation. In the ISR lesion for PES in EES, infiltrations with foam cells macrophages, particularly numerous eosinophilic cell infiltrations, suggest a persistent strut hypersensitivity reaction. We found a remarkable histopathological heterogeneity of ISR. The study using coronary endarterectomy specimens can give us pivotal information about the histopathological heterogeneity of ISR.

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1. Introduction

Drug-eluting stent (DES) for the treatment of coronary artery diseases is advantageous over bare-metal stent (BMS) due to the high reduction in restenosis rate and target lesion revascularization [1]. However, in-stent restenosis (ISR) remains the major problem even after DES implantation. The efficacy of DES in patients with ISR after prior DES implantation has not been completely clarified. Studies have reported even worse outcomes in DES implantation for in-DES restenosis as compared with BMS implantation [2]. Although heterogeneous inflammatory reactions are known after implantations of BMS and DES [4], the reactions to DES implantation in ISR lesions are largely unknown.

Coronary endarterectomy and stent removal with onlay patch grafting, an effective surgical option in patients with diffuse stenosis [3], give us an opportunity to evaluate endarterectomy specimens. Here, we histopathologically compare four patients for ISR after the implantation

of a BMS, sirolimus-eluting stent (SES), or paclitaxel-eluting stent (PES) in an everolimus-eluting stent (EES) by using removed specimens.

2. Case report

All four patients had ISR in the left anterior descending artery (LAD) and underwent onlay patch grafting using the left internal mammary artery after endarterectomy and stent removal [3].

A 56-year-old man with hypertension, type 2 diabetes mellitus, and smoking history (Case 1) developed acute anteroseptal myocardial infarction and underwent BMS employment in the middle portion of the LAD. After an 8-year asymptomatic period under poor risk controls for diabetes, hypertension, and smoking, he had developed shortness of breath resulting from congestive heart failure. Emergency coronary angiography revealed severe stenosis of all three coronary arteries, including the BMS-employed portion of the LAD. The patient undertook off-pump coronary artery bypass for LAD and diagonal branches and posterolateral branch of the right coronary artery (RCA). After the ISR specimen was removed, LAD was reconstructed by onlay patch grafting. A histopathological study of the ISR specimen showed CD68-positive foam cell proliferation with de novo fatty streak formation over stabilized neointima consisting of α smooth muscle actin (α -SMA)-positive smooth muscle cells (Fig. 1A–1D).

A 69-year-old man with hypertension, type 2 diabetes mellitus, and smoking history (Case 2) underwent SES at the proximal portions of the

Abbreviations: DES, drug-eluting stent; ISR, in-stent restenosis; BMS, bare metal stent; SES, sirolimus-eluting stent; PES, paclitaxel-eluting stent.

We have no conflict of interest to declare.

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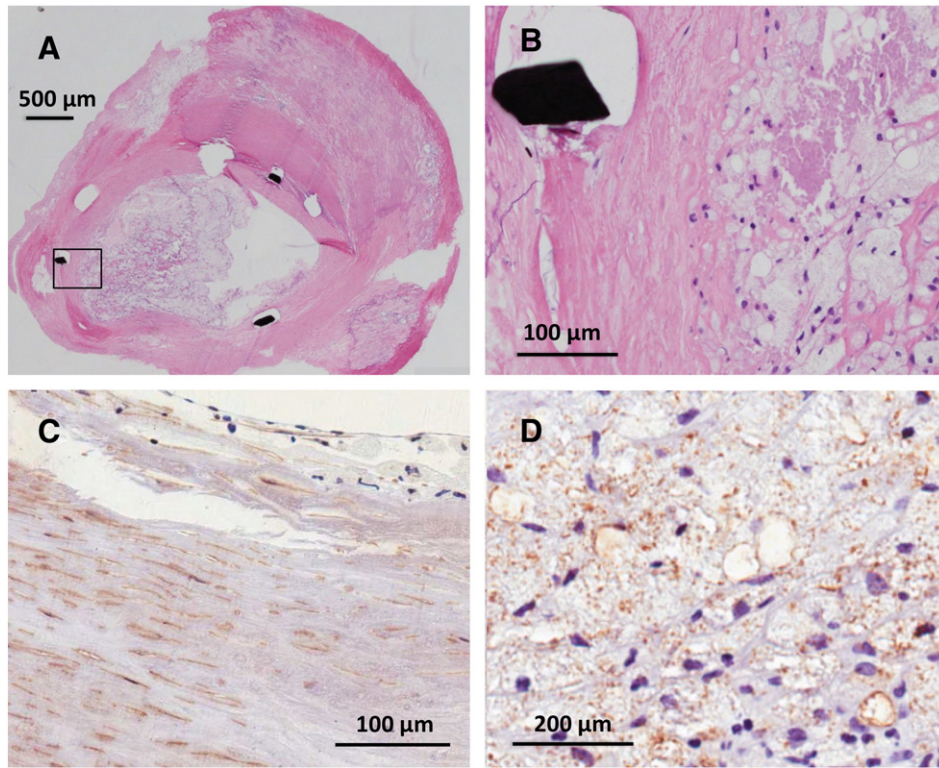


Fig. 1. Photomicrographs from Case 1 showing in BMS implanted for 8 years. Foam cell proliferation on hyalinized neointima occupies the lumen (A and B, hematoxylin and eosin staining). Neointima is positive for α smooth muscle actin (α -SMA) (C) and foam cells are positive for CD68 (D).

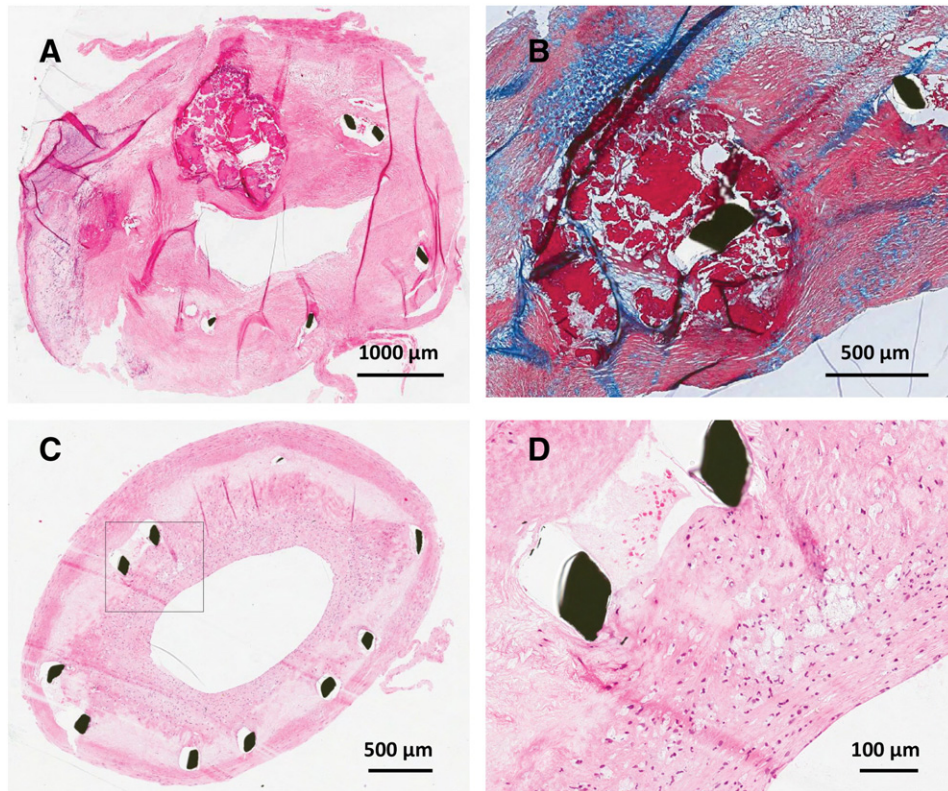


Fig. 2. Photomicrographs from 2 SES cases (Case 2, SES for 4.5 years, A and B; Case 3, SES for 3 years, C and D). A and B show hyalinized neointima causing ISR and nodular calcified thrombus around stent strut protruding into the lumen. C shows fatty streak formation in concentric neointima. D is higher magnification of C that demonstrates foam cells accumulating in neointima. A, C, and D : hematoxylin and eosin staining. B: Masson's trichrome staining.

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