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CASE REPORT

Bare metal stent implantation for in-stent restenosis with a drug-eluting stent

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Summary Following the positioning of a bare metal stent (BMS) implant, a yellow plaque is healed with a reduction of the color grade and thrombogenicity, i.e. vulnerability by angioscopy in the chronic phase (''plaque sealing'' of BMS; the ''whitening effect'' of BMS). However, we have reported that thrombus and yellow plaque increases at the drug-eluting stent (DES) site.

A 71-year-old man underwent percutaneous coronary intervention using two DESs for a severe stenotic lesion in his right coronary artery. Follow-up coronary angiography (CAG) showed in-stent restenosis (ISR) at the stent-overlap site. We performed traditional balloon angioplasty, but follow-up CAG showed ISR again at the same position as the first restenosis. In angioscopic findings, the normal vessel wall was white, but the site of DES implantation was yellow and a yellow, soft, swelling neointimal proliferation-like vulnerable plaque was observed at the restenotic site. In expectation of the ''whitening effect'' of BMS, we implanted a new BMS. As anticipated, follow-up CAG showed no restenosis. Moreover, the angioscopic findings indicated a clean, white, neointimal proliferation-like stable plaque at the BMS implant site in the yellow vulnerable area of DES. The ''BMS in DES'' therapy should be considered one of the strategies for ISR of DES.

Introduction

Since the introduction of drug-eluting stents (DES), the problem of restenosis of percutaneous coronary intervention (PCI) has been partially resolved. However, compared to bare metal stents (BMS), the risk of very late stent thrombosis appears to be marginally higher and restenosis of DES can occur. The deployment of DES to treat BMS restenosis has

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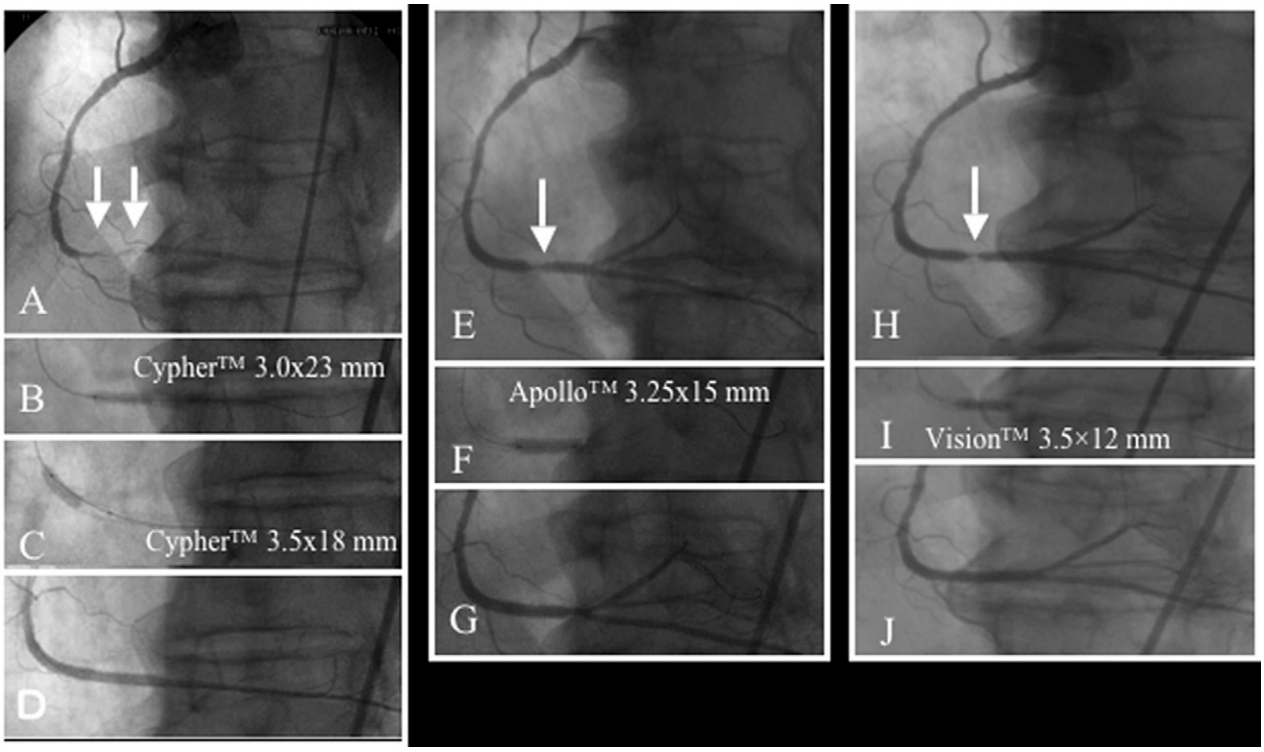

Figure 1 Coronary angiography. (A—D) On February 15, 2005, two SESs (3.0 mm × 23 mm and 3.5 mm × 18 mm) were successfully implanted at the stenotic lesion in the right coronary artery. (E—G) After one year, he exhibited the first restenosis and we successfully performed plain old balloon angioplasty for the first restenotic lesion. (H—J) After 3 months, he exhibited a second restenosis and we used a new BMS for the restenotic lesion. The arrows indicate the stenotic lesions.

become routine practice, but the strategy for DES restenosis has not been established.

Case report

Diagnostic angiography was conducted on a 71-year-old male complaining of chest pain and it revealed a significant stenotic lesion in the right coronary artery. Elective PCI of the lesion was performed, using two DES on February 15, 2005. A Cypher™ stent (Cordis, Miami Lakes, FL, USA) (3.0 mm × 23 mm; 16 atm) was initially implanted in the distal position of the stenotic lesion and a Cypher™ stent (3.5 mm × 18 mm; 18 atm) was next implanted with partial overlapping (Fig. 1A—D). He had some coronary risk factors including diabetes mellitus, hypertension, and hypercholesterolemia. Antihypertensives, statin, and insulin were administered after his admission. His blood pressure was well controlled and his total cholesterol and low-density lipoprotein cholesterol levels were 146—183 mg/dl and 60—116 mg/dl, respectively. Plasma glucose level was 119—159 mg/dl and hemoglobin A_{1C} was 6.1—6.6%. After one year, follow-up angiography revealed an initial restenosis at the stent overlapping position. Plain old balloon angioplasty was performed with a high-pressure balloon (ApolloHP™; Avantec Vascular Corp., Sunnyvale, CA, USA) (3.25 mm × 15 mm; 20 atm) on March 2, 2006 (Fig. 1E—G). After 3 months, follow-up angiography revealed a second restenosis at the same position. By angioscopy, the vessel wall was almost white, but the site of DES implantation was yellow. Moreover, the second restenotic lesion exhibited a yellow, soft, swelling neointimal proliferation-like vulnerable plaque. In anticipation of a ''whitening effect'' of BMS, we implanted a new BMS (Vision™; Abbot Vascular, Santa Clara, CA, USA) (3.5 mm × 12 mm; 20 atm) on July 25, 2006 (Figs. 1H—J and 2). We performed follow-up angiography and angioscopy on January 23, 2007. Based upon angiography, we were not able to find a third restenosis. Angioscopic findings showed a white, clean neointimal proliferation-like stable plaque at the BMS implanted site in the yellow vulnerable area of DES (Fig. 3). The patient has not exhibited any further restenosis until now.

Discussion

Angioscopy of the coronary artery can be used to identify morphologic changes, especially plaque and thrombus formation. For plaque formation, the more yellow the color, the more vulnerable the disposition. In other words, dark yellow plaques appear to have a lipid rich core with a thin fibrous cap, i.e. suggesting vulnerability, whereas a white plaque is stable. With the introduction of DES, the problem of restenosis after percutaneous stent implantation was partially resolved. The deployment of DES to treat the ISR of BMS has become routine practice, while a strategy for the ISR of DES has yet to be established. Because the excessive proliferation of neointima almost causes the ISR of BMS, DES implantation is an ideal strategy for it. The mechanism of ISR of DES seems to be various, unknown and different from BMS.