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Treatment of recurrent vein graft “stent-in-stent” re-stenosis guided by optical coherence tomography

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Keywords

Vein graft; Re-stenosis; Optical coherence tomography; Coronary artery disease

A 78 year old man presented with recurrent in-stent re-stenosis of the saphenous vein graft to the right coronary artery (RCA), causing unstable angina. He received coronary artery bypass grafting (CABG) 25 years previously with a left internal mammary artery (LIMA) graft to the left anterior descending artery (LAD) and a saphenous vein graft (SVG) to the RCA. Surgery provided medium term relief but progressive disease in the saphenous vein grafts led to recurrence of symptoms.

Multiple coronary interventions were performed over the ensuing 25 years in attempts to restore the patency of the SVG graft, which supplied the RCA and LAD via collaterals. These included insertion of a 4.0/16 mm Palmaz-Schatz stent 9 years after surgery, followed by restenting with a 4.0/16 mm Liberte stent 10 years later for in-stent restenosis. He underwent further intravascular ultrasound (IVUS) guided angioplasty to the in-stent re-stenosis with a cutting balloon 6 years later, but his unstable angina symptoms recurred promptly and he was referred to this Hospital for further management.

Coronary angiography revealed two significant lesions in the RCA SVG, with the distal lesion indicative of in-stent re-stenosis (Fig. 1a). Optical coherence tomography (OCT, Lightlab C7-XR) was performed to assess the lesion morphology. The proximal lesion consisted predominantly of a fibrous cap with lipid core and a small calcific component (Fig. 1b). OCT image of the distal lesion revealed two previous stents (Fig. 1c), with significant “stent-in-stent” re-stenosis due to neo-intimal formation. Tight stenosis of the lumen was predominantly due to the neo-intima lining the inner stent (green arrow), but there was also significant old neo-intima between the inner and outer stent (white arrow).

OCT enabled accurate measurement of the dimension of the stents in-situ. This guided the selection of 3.5/10 mm and 4.0/10 mm cutting balloons for disruption of the thick neo-

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Disclosures

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intima. The angiographic appearance after cutting balloon dilation showed significantly improved flow (Fig. 1d), and the OCT image revealed evenly disrupted neo-intima within the second stent (Fig. 1e, f). Both proximal and distal lesions were subsequently stented with Cypher stents (3.5/28 mm and 3.5/33 mm respectively) to good angiographic and OCT results (Fig. 1g, h, i).

The utility of OCT assessment in guiding the management for various presentations of stable or acute coronary disease has been previously reported [1,2]. The management of vein graft (VG) disease can be clinically challenging, as the relationship between angiographic appearance and VG disease is less clear [3]. Given its superior resolution, OCT is a particularly useful adjunct to angiography at assessing VG disease compared to IVUS [4].

This case demonstrates the challenges in managing recurrent re-stenosis within a vein graft which was the main inflow supply of the entire myocardium. Although the recurrent re-stenosis was predominantly caused by neo-intima formation within the latest stent, the neo-intima within the “sandwich” layer also contributed to re-stenosis necessitating subsequent intervention. Such a sandwich layer was likely due to inadequate pre-dilation of the neo-intima at the time of the second stenting. OCT assessment in this case enabled clear definition of the components contributing to the re-stenosis, accurate sizing of the cutting balloon, confirmation of its effects on pre-dilatation, and subsequent selection of appropriately sized stents.

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Fig. 1.

Figure panel: Angiographic and OCT images of the vein graft stenosis. Angiogram (figure a) reveals two disease segments within the right coronary artery saphenous vein graft (white arrows). The proximal lesion (figure b) consists of predominantly of a fibrous cap with a rich lipid core (yellow arrow) and a small calcific component (grey arrow). The distal lesion (figure c) consists of near obstructive neo-intimal formation within the two previous stents (green and white arrow). Figure d shows the angiographic appearance of the distal lesion (white arrow) after attempts of cutting balloon angioplasty. OCT (figure e, f) reveals evenly disrupted neo-intima within the re-stenosis, with the white arrows marking serrations made

by the cutting balloon. Figure g shows the angiographic appearance of both lesions post stenting (white arrows). OCT images show good stent apposition in both lesions (figure h, i). In the distal lesion (figure i) there are 3 stents in-situ (blue, green, white arrows) after the procedure. (White asterisk represents guidewire artefact in all figures.).