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How should I treat a post-CABG patient who presents with myocardial infarction within two months of surgery?

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CASE SUMMARY

BACKGROUND: A 78-year-old diabetic male with chronic stable angina. He had undergone CABG about three months previously. Recently he developed severe retrosternal chest pain of four hours duration with subsequent angina and dyspnoea on minimal exertion.

INVESTIGATION: electrocardiography, echocardiography, coronary angiography.

DIAGNOSIS: Post-CABG myocardial infarction, predominantly due to tight stenosis of the SVG to RCA.

MANAGEMENT: PCI vs. repeat CABG, and PCI to native vessels vs. PCI to graft vessels was discussed by the Heart Team. PCI to the SVG to RCA was carried out.

KEYWORDS: embolic protection device, graft vessel PCI, myocardial infarction, post-CABG, SVG stenosis

PRESENTATION OF THE CASE

A 78-year-old diabetic male with chronic stable angina had undergone a coronary arterial angiogram four months before. He was diagnosed as having triple-vessel disease and had undergone CABG about three months previously. One arterial (left internal mammary artery [LIMA] to left anterior descending [LAD]) and three venous grafts (to the diagonal, obtuse marginal [OM] and right coronary artery [RCA]) were used for CABG. He had no other comorbid conditions. About 15 days before, he developed severe retrosternal chest pain at rest lasting for four hours and since then was having angina and dyspnoea on minimal exertion. His electrocardiogram showed new Q-waves with T-wave inversion in the inferior leads, and echocardiography showed new regional wall motion abnormality (RWMA) in the inferior wall of the left ventricle. We then carried out a coronary arterial angiogram of the native and graft vessels **(Figure 1-Figure 6, Moving image 1-Moving image 4)** which showed a proximal LAD 95-99% lesion, proximal RCA 100%, proximal OM1 50% lesion, proximal to mid saphenous vein graft (SVG) to RCA long segment lesion 95% (TIMI 2 flow), variable degrees of stenosis of the other graft-native vessel anastomotic points.

Should we go for repeat revascularisation or keep the patient only on medical management?

If revascularisation is planned, considering the type of lesion, should we plan for redo CABG or PCI?

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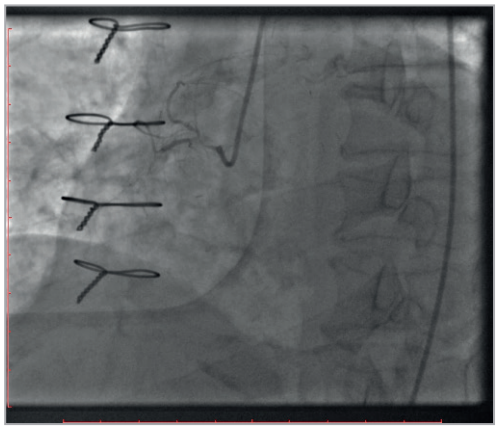

Figure 1. *Left anterior oblique (LAO) view of the RCA.*

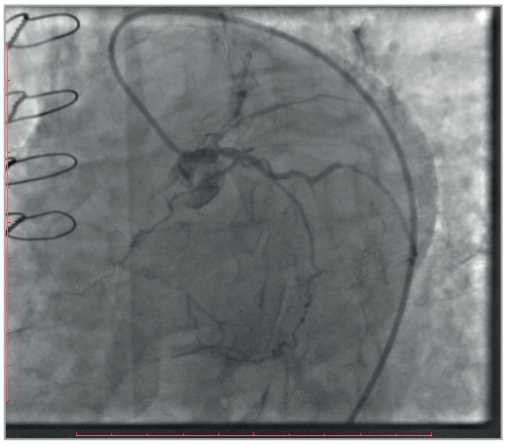

Figure 2. *LAO view of the left coronary arteries.*

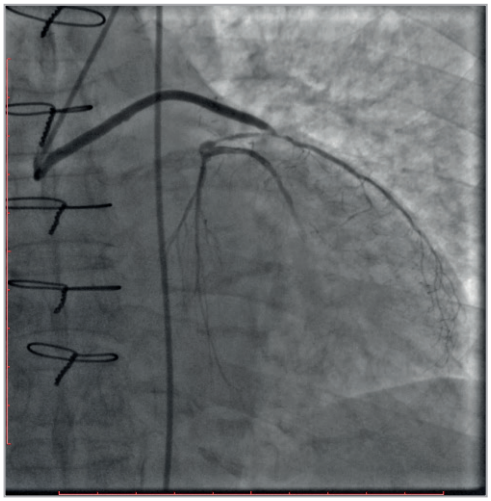

Figure 3. *LAO caudal view of the venous graft to diagonal.*

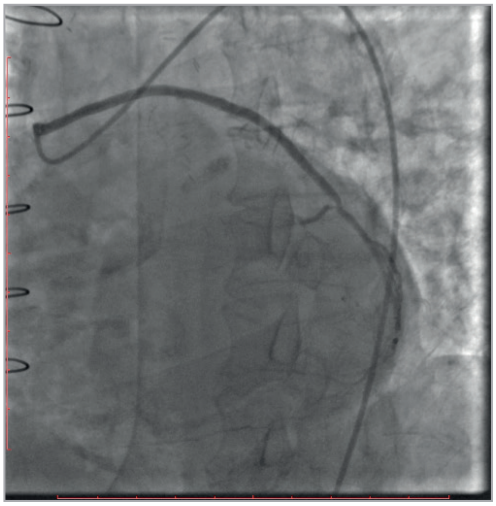

Figure 4. *LAO caudal view of the venous graft to obtuse marginal (OM).*

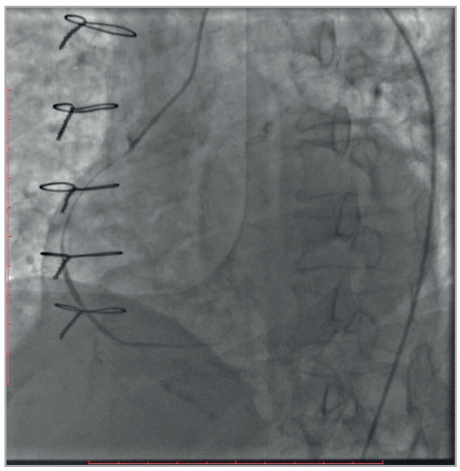

Figure 5. *LAO view of the SVG to RCA.*

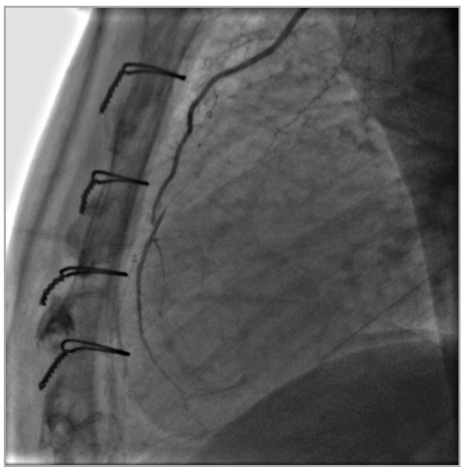

Figure 6. *Lateral view of the LIMA to LAD.*

If we plan for PCI, should we even attempt native vessel PCI of the RCA in this patient or should we directly plan for PCI to the SVG to RCA?

Should we also attempt PCI of the other grafts which are showing variable degrees of stenosis at the graft-native vessel anastomosis points?

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How would I treat?

THE INVITED EXPERTS' OPINION

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The following case is compelling, as well as challenging. A 78-year-old male who had undergone coronary artery bypass grafting (CABG) three months earlier presented at the author's department with recurrent angina and dyspnoea on minimal exertion. Discussing potential clinical management plans, the author faced several clinical scenarios.

The option of repeat revascularisation or medical management should be discussed in a Heart Team meeting with an interventional cardiologist and a cardiac surgeon[1,2]. This patient was also discussed by our Heart Team. The information that is needed before a decision can be taken comprises an ECG, echocardiogram, and the coronary angiogram (CAG) from before the CABG took place. Furthermore, a postoperative CAG with visualisation of the anastomoses in different directions is critical. The description of the current ECG and echocardiogram suggests that an inferior myocardial infarction (MI) has already occurred. The echocardiogram showed regional wall motion abnormality (RWMA). Using non-invasive cardiac imaging we would investigate the presence of any viable myocardium[2-4]. In case this is present, repeat revascularisation would be the first choice of treatment in a symptomatic patient. First choice of treatment: based on the angiogram, it seems there are technical errors at three anastomotic sites. The left internal mammy artery (LIMA) to the left anterior descending (LAD) and the venous graft to the obtuse marginal seem to have a significant stenosis at the graft-native vessel anastomosis. The fact that the LIMA to the LAD is compromised and the proximal part of the vessel occluded provides a strong argument for a redo CABG[2], bearing in mind the higher risk that comes with reoperation[2,5]. The anastomosis of the venous graft on the diagonal branch was performed on a diseased section of the coronary vessel and should be made more distally. In case of myocardial viability in the inferior wall, a new bypass to the right descending posterior should be performed.

Second choice of treatment: it does not seem to be useful to revascularise only the RCA but the target for PCI of the RCA is the native vessel, while the stenotic SVG and the anastomosis should be avoided due to concerns over embolisation or perforation[2]. If possible, the length of the occlusion needs to be established on the preoperative CAG images before trying to accomplish patency of the chronic totally occluded (CTO) right coronary artery.

Third choice of treatment: PCI of the anastomosis of the LIMA-LAD, of the anastomosis of the venous graft on the diagonal and of the anastomosis of the venous graft on the obtuse marginal.

Early graft failure is an important complication after CABG. Although it is not routinely used, flow measurement of the grafts can be a valuable instrument for intraoperative quality assessment of bypass grafts[1,6].

Conflict of interest statement

The authors have no conflicts of interest to declare.

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How would I treat?

THE INVITED EXPERT'S OPINION

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The patient is a 78-year-old male with diabetes and multivessel coronary disease who had undergone quadruple bypass surgery three months before (LIMA to LAD, and three venous grafts to the distal RCA, a diagonal and a marginal branch, respectively). The patient had a four-hour episode of chest pain with new Q-waves in the inferior leads and kinetic abnormalities revealed by echocardiography and he has experienced incapacitating angina ever since.

The fact that the patient has severe persistent angina is a valid indication for revascularisation even though there is no certainty as to the existence of peri-necrotic ischaemia around the inferior infarcted territory or in other territories. The location of ischaemia is unknown.

The extent of coronary disease is as follows: the native right coronary artery is occluded from its origin with a very long lesion which seems to be a potentially poor indication for revascularisation; the LAD is occluded from one centimetre beyond its origin and the circumflex artery is patent. Lesions are present in three of the four grafts: tight anastomotic lesion of the LIMA graft to the LAD, tight anastomotic lesion of the venous graft to the diagonal branch, patent venous graft to the marginal, very tight and long (>30 mm) ostial lesion of the venous graft to the RCA with slow distal run-off.

The most obvious lesion is in the venous graft to the RCA. Nevertheless, I have some doubts as to whether this lesion is the cause of angina and the inferior MI is not transmural.

In this particular case, I would implement the following strategy: angioplasty of the LIMA/LAD anastomosis with DES implantation and angioplasty of the anastomosis of the venous graft to the diagonal branch with implantation of a short DES. Should the patient's symptoms improve and given his age, I would not carry out any further revascularisation. Should his incapacitating angina persist, I would perform an angioplasty of the venous graft to the RCA. This, albeit feasible, would require long-segment stenting in a venous graft, which has been shown to be associated with poor outcomes in diabetic patients.

This patient is clearly in a very active phase of his coronary artery disease as evidenced by the presence of lesions in the anastomoses of most of his grafts. As a consequence, additional restenosis is quite likely to occur.

Conflict of interest statement

The author has no conflicts of interest to declare.

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How did I treat?

ACTUAL TREATMENT AND MANAGEMENT OF THE CASE

The patient presented with recent onset chest pain with an electrocardiogram showing new Q-waves in the inferior leads and an echocardiogram showing new RWMA in the inferior wall of the left ventricle. His coronary artery angiogram shows severe stenosis of the SVG to RCA with TIMI 2 flow. There were also variable degrees of stenosis at the native vessel and graft vessel anastomosis points, but TIMI 3 flow was maintained in these vessels. Hence, in the light of the clinical features, electrocardiogram and echocardiogram features, we came to the conclusion that the lesion in the SVG to RCA was the culprit lesion.

After discussion with the Heart Team, which included the cardiologists and cardiothoracic surgeons, it was decided to go for revascularisation rather than medical management only, as it was a case of recent acute coronary syndrome resulting in left ventricular dysfunction.

As shown in previous studies, the mortality and morbidity rate of redo CABG is quite high as compared to PCI[7]. Since this patient is a 78-year-old male and the other vessels had TIMI 3 flow, we were of the opinion to perform PCI to revascularise the RCA territory.

There are anomalous results regarding graft vessel PCI. Previous studies have shown that PCI to the native vessel should be preferred over graft vessel PCI[8]. However, in our case the whole of the RCA was diseased with a long chronic total occlusion (CTO) segment. Hence, we decided not to try native vessel PCI of the RCA as the chances of success were less and there was an increased risk of contrast-induced nephropathy as he was an elderly diabetic patient.

We went ahead with the plan to carry out PCI to the SVG to RCA using a distal embolic protection device (filter device) and two overlapping drug-eluting stents. We achieved a good result with TIMI 3 flow rate **(Figure 7-Figure 9, Moving image 5-Moving image 7)**.

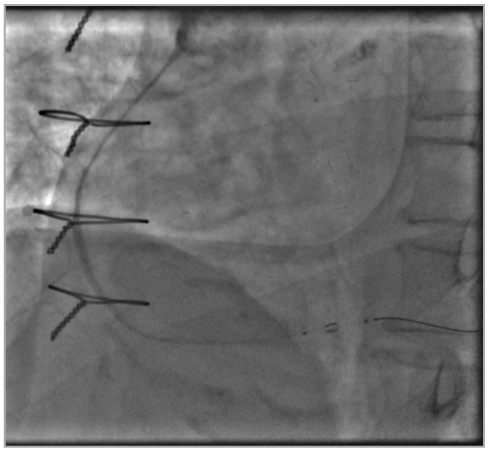

Figure 7. *LAO view showing distal embolic protection device (filter) placement.*

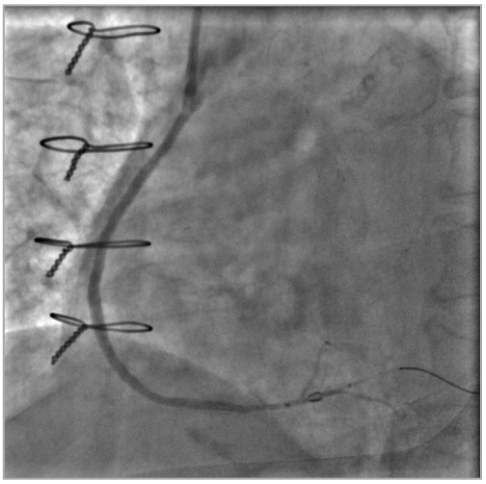

Figure 8. *LAO view of the SVG to RCA after stenting.*

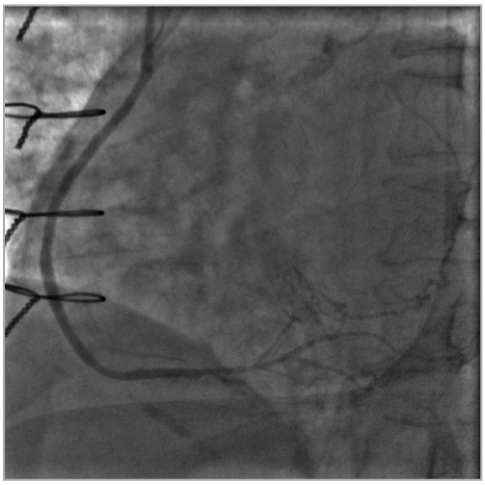

Figure 9. *Final LAO view after stenting and retrieval of the filter.*

Since the other graft vessel-anastomotic sites were showing variable degrees of stenosis, we did not do anything since TIMI 3 flow was present. We planned to keep the patient on optimal medical management and to have a thallium stress test carried out if the patient becomes symptomatic in future.

Conflict of interest statement

The author has no conflicts of interest to declare.

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Supplementary data

Moving image 1. LAO caudal view of venous graft to diagonal.

Moving image 2. LAO caudal view of venous graft to obtuse marginal (OM).

Moving image 3. LAO view of SVG to RCA.

Moving image 4. Lateral view of LIMA to LAD.

Moving image 5. LAO view showing distal embolic protection device (filter) placement.

Moving image 6. LAO view of SVG to RCA after stenting.

Moving image 7. Final LAO view after stenting and retrieval of the filter.