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Guiding Catheter-Induced Dissection with the Closure of the Last Patent Bypass Graft – A Case Report

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■ Summary

We present guiding catheter-induced dissection of left internal mammary artery (LIMA) bypass graft in a young high-risk patient with severe coronary artery disease. This iatrogenic complication was followed by periprocedural infarction without cardiogenic shock or hemodynamic instability. We resolved the occluding dissection with long multiple stenting successfully. We expected a poor prognosis of our patient because of the depressed LV function. Nevertheless, the patient improved during the time on conservative treatment, without the necessity for heart transplantation.

■ Introduction

Compared to percutaneous coronary interventions (PCI) on native vessels, the intervention of arterial bypass graft is a rare procedure [1]. Therefore, large trials are not available in this area. When performed by an experienced team, PCI of arterial graft is safe procedure with acceptable long-term results [2]. Complications may occur especially in very tortuous grafts. Iatrogenic dissection of the left internal mammary artery (LIMA) is a rare, but sometimes very dangerous complication.

■ History

A 44-year-old man with a history of myocardial infarction (MI) and triple coronary bypass grafting performed 5 years earlier was admitted to our department. He was transferred from peripheral hospital for subacute Q MI of the inferior wall. His risk factors were hypertension and hyperlipidemia, he was a former smoker.

On angio we found the closure of both saphenous venous grafts (SVG) for right coronary artery (RCA) and left circumflex (LCx) (Fig. 1), moreover with 90% stenosis of tortuous left internal mammary artery (LIMA) in anastomosis to left anterior descending (LAD) (Fig. 2). On the native vessels we found the occlusion of middle part of LCx and LAD with additional significant stenoses of left main coronary stem (LMS), small right coronary artery (RCA), and proximal LAD (Fig. 3–4). Left ventricle ejection fraction (LVEF) measured by ventriculography was 40% with inferior wall akinesis. We tried to recanalise the SVG for LCx as well the native LCx without success, RCA was not suitable for PCI. We discussed the possibility of repeating the surgical revascularisation, which was refused by the patient. He was discharged in stable condition, remaining on dual antiplatelet therapy. The second step was a staged procedure on the LIMA three weeks later.

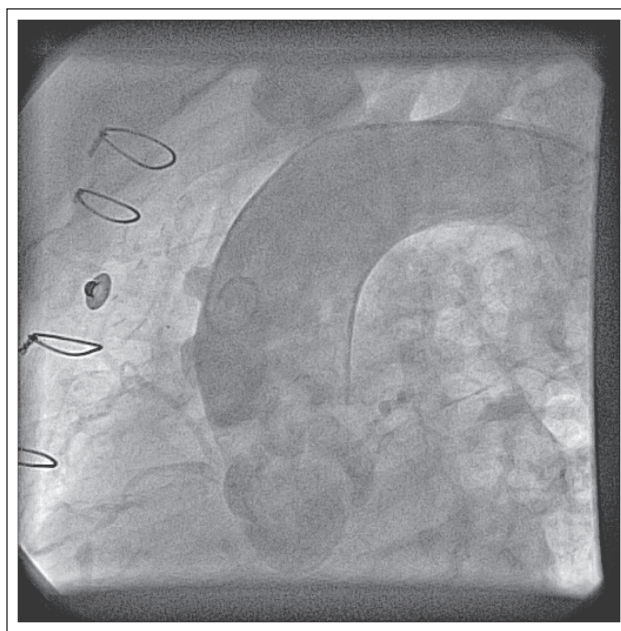


Figure 1. Aortography: closure of saphenous venous grafts for LCx and RCA behind proximal anastomoses.

■ Procedure

Our strategy was an elective drug-eluting stent implantation into the LIMA-LAD lesion. We used a 6F IM Vista guiding catheter (Cordis), BMW guide wire (Abbott Vascular). A standard weight-adjusted dose of heparin was given intravenously (80 IU/kg). Shortly after the insertion of guiding catheter the patient experienced chest pain, there were ST elevations in precordial leads on ECG. There was an occluding dissection on angio in the proximal part of LIMA, induced by guiding the catheter (Fig. 5). The occlusion was persisting after nitrates given into the guiding catheter. Although there was an occlusion of the last patent graft, the patient was not in a cardiogenic shock. That indirectly showed evidence of the presence of previously invisible collaterals. Invasive blood pressure was 140/90 mmHg, we gave anodynes (fentanyl) and nitrates in continual infusion. Activated clotting time (ACT) value was 302 seconds, measured by Hemochron whole blood coagulation system (ITC, Edison, NJ).

We were not able to wire the true lumen with BMW wire, so we changed to the PT2 Light Support wire (Boston Scientific) (Fig. 6). After 15 minutes we successfully wired LAD periphery. We put a long bare metal stent Multilink Zeta 3,5/38 mm (Abbott Vascular) in the proximal part of LIMA with the goal to cover the end of the dissection (Fig. 7). Unfortunately,

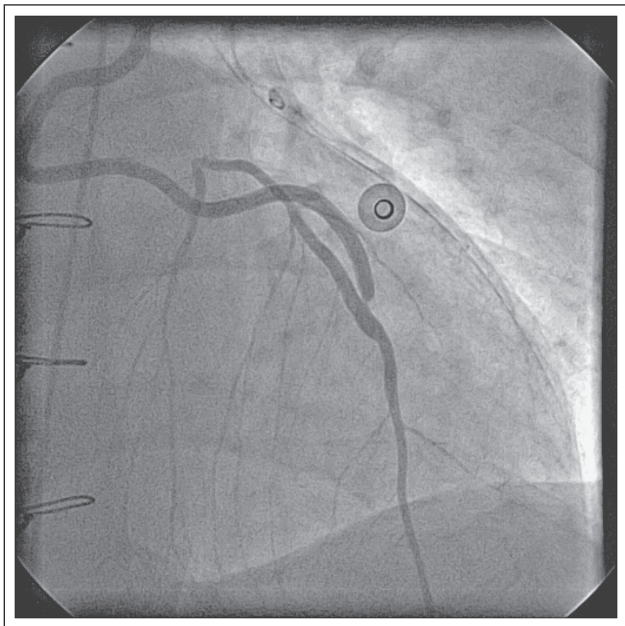


Figure 2. Angio of LIMA: 90% stenosis in LIMA-LAD anastomosis.

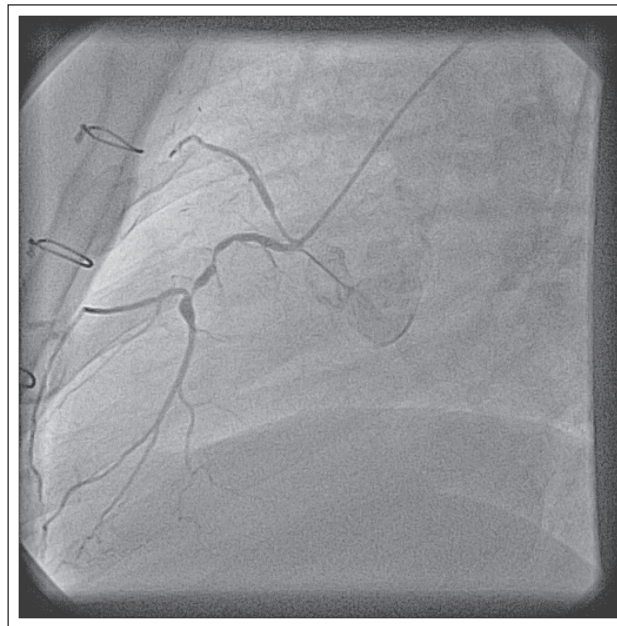


Figure 4. Angio of RCA: diffuse 80–90% disease of proximal and middle part, small periphery.

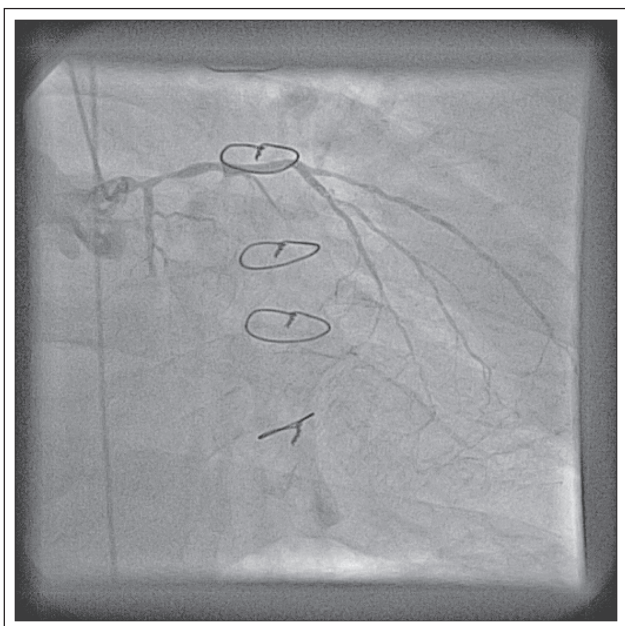


Figure 3. Angio of LCA: 80% stenosis of distal left main stem (LMS), 90% stenosis of proximal LAD, closure of middle LAD and LCx.

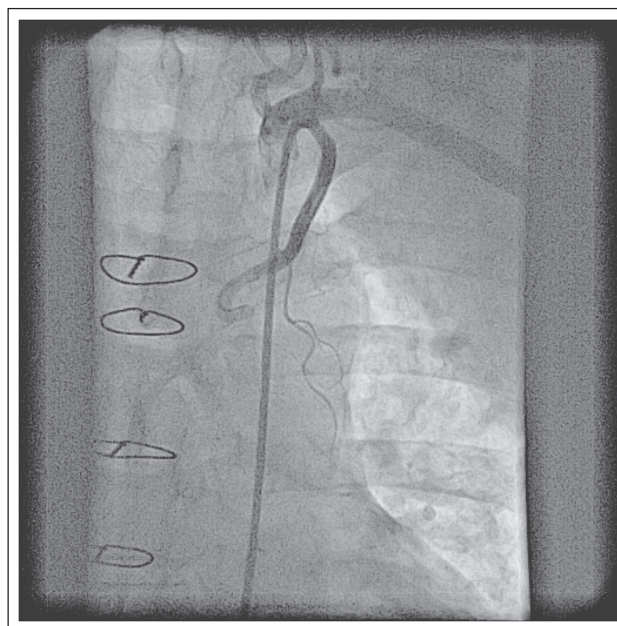


Figure 5. PCI of LIMA: guiding catheter-induced occluding dissection in the proximal part.

there was not any impact on distal flow. It was clear that the dissection involves the whole length of LIMA from origin to the LAD anastomosis.

Therefore, we changed our strategy and covered whole LIMA from primary lesion to origin with seven bare metal stents in total length of 220 mm. We implanted five Multilink Zeta stents (Abbott Vascular) and two Flexmaster F1 stents (Jomed). We had to use the “buddy wire” technique because of severe LIMA tortuosity. The patient was hemodynamically stable, the total time of LIMA occlusion was 42 minutes. We finished with optimal result and TIMI 3 flow after postdilations with non-compliant balloons (Fig. 8).

The patient was discharged seven days after PCI on dual antiplatelet therapy, a large periprocedural MI was confirmed with Troponin I value 182 ng/ml. He was free of symptoms.

Outcome

Four months later, the patient was admitted to a peripheral hospital for acute congestive heart failure (CHF), complicated with sepsis and transient pancytopenia. We found diffuse 60% in-stent restenosis in middle part of LIMA on control angio (Fig. 9), there was an optimal result in LIMA-LAD anastomosis. LVEF was 25–30%, we found no viability in LIMA-LAD

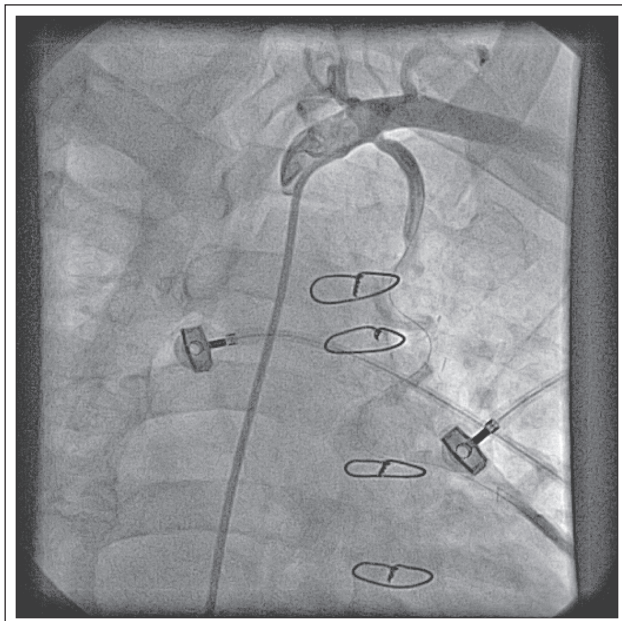


Figure 6. PCI of LIMA: wiring of true lumen of dissected LIMA with PT2 LS wire.

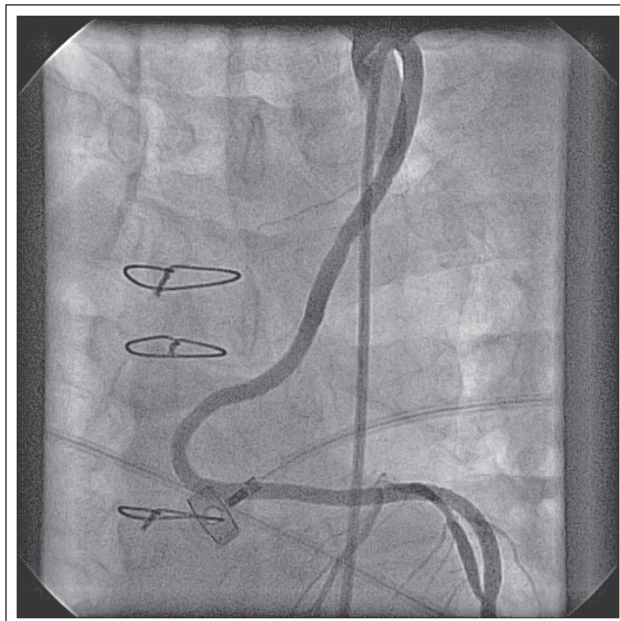


Figure 8. PCI: final result – “full metal jacket” from LIMA-LAD anastomosis to the origin of LIMA, TIMI 3.

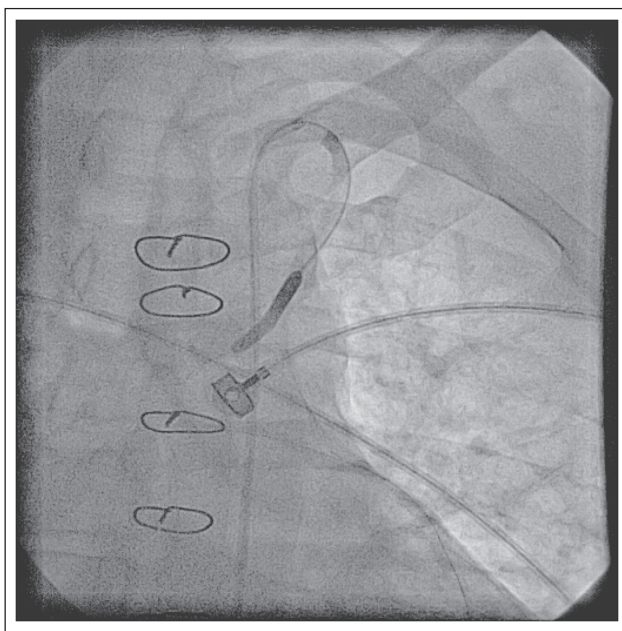


Figure 7. PCI: long stenting of proximal LIMA, without impact on flow.



Figure 9. Follow-up angio 4 months after PCI: 60% diffuse in-stent restenosis in tortuous middle part of LIMA, optimal result in LIMA-LAD anastomosis.

or RCA territory on dobutamine echo. Therefore, we treated only significant stenosis of the LMS and proximal LAD with a bare metal stent with the goal to prevent ischemia of first the diagonal branch (D1) territory. We established maximal medical treatment of congestive heart failure – betablockers, ACE-inhibitors, furosemide, spironolactone and digoxin, moreover aspirin with statins.

The patient presented to our follow-up control three months later. The LVEF checked by the echocardiography was 33%. The patient was in the class NYHA II without angina, he felt much better compared to the previous visit and refused planned angiographic control. Because of this improvement,

there was no reason to put him on the heart transplantation waiting list. We regularly monitored his status in our CHF office. On the last telephone control 16 months after index PCI he was still free of angina, having dyspnoea class NYHA II.

Discussion

We present a guiding catheter-induced dissection of LIMA in a young high-risk patient with periprocedural infarction but without hemodynamic collapse. Although we have stand-by intraaortic balloon pump (IABP, Datascope) in our cathlab, it was not necessary to insert it because of the good hemodynamic status. We treated the acute complication with long

stenting, but we expected a poor prognosis because of the signs of congestive heart failure and depressed LV function. We observed the improvement of the patient's status during the time on conservative treatment.

There are certain risk factors of dissection of native coronary vessels, which can predict the complication rate during PCI – calcifications in the aortic wall or in the coronary ostia, tortuosity, diffuse disease [3]. Although the procedure on the arterial grafts could be different compared to native vessels, the tortuosity remains a strong predictor of complications. Sometimes we can see a problematic intubation of LIMA origin, which can cause the dissection. We found only few cases published in the electronic sources [4, 5]. In the case of long dissection, a “full metal jacket” is very often the only possibility to resolve this complication [6]. To avoid this unpleasant surprise, a very careful manipulation with guiding catheter (rather rotation than pushing) is recommended.

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