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CASE REPORT
Coronary intervention

Primary percutaneous intervention in an unusual vessel using an unusual technique: a case report

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Background Primary percutaneous intervention (PPCI) of the saphenous vein graft (SVG) is associated with a high risk of distal embolization and no reflow, since SVG lesions are often very friable and have a large thrombotic burden. We report a case of successful PPCI of the SVG using guide catheter thrombectomy with novel double wire technique.

Case summary A 60-year-old male with a past history of coronary artery bypass grafting presented with acute thrombotic occlusion of the SVG to the obtuse marginal graft. Despite appropriate pharmacotherapy (*GPIIb/IIIa inhibitors*) and thrombosuction, there was a large residual thrombus burden with poor distal flow. In the present case, we decided to perform guide catheter thrombosuction. An exchange length floppy 0.014' wire was passed alongside the pre-existing wire and the 6 Fr JR guide catheter was exchanged for a less traumatic 5 Fr JR guide catheter over the exchange wire. The first wire was kept distally in the vessel along the guiding catheter to maintain the access to the graft vessel. The 5 Fr JR guide catheter was slowly advanced over the wire to the distal portion of the graft, keeping the other wire in the distal portion of the graft to maintain access. A large amount of thrombus was aspirated and the patient improved dramatically.

Discussion This double wire technique is an effortless and novel way to maintain access to the distal vasculature of the occluded artery, while the guide can be safely intubated deep into the coronary artery that helps in removing a very large amount of thrombus because of their larger internal lumen.

Keywords Saphenous vein graft • Primary percutaneous coronary intervention • Thrombosuction • Guide thrombectomy • Case report

ESC curriculum 3.2 Acute coronary syndrome • 3.1 Coronary artery disease • 3.4 Coronary angiography

Learning points

- Primary percutaneous intervention of the saphenous vein graft (SVG) disease is a major challenge since patients with SVG diseases often have a high-risk profile and SVG lesions often are friable with a large thrombus burden as well.
- Guide catheter thrombosuction can be used as a bailout modality in situations where pharmacological therapy and thrombosuction catheter fail to restore the flow.
- A simple double wire *in situ* technique ensures prompt and true access to the lumen of the coronary artery even if dissection occurs or the distal vessel collapses.

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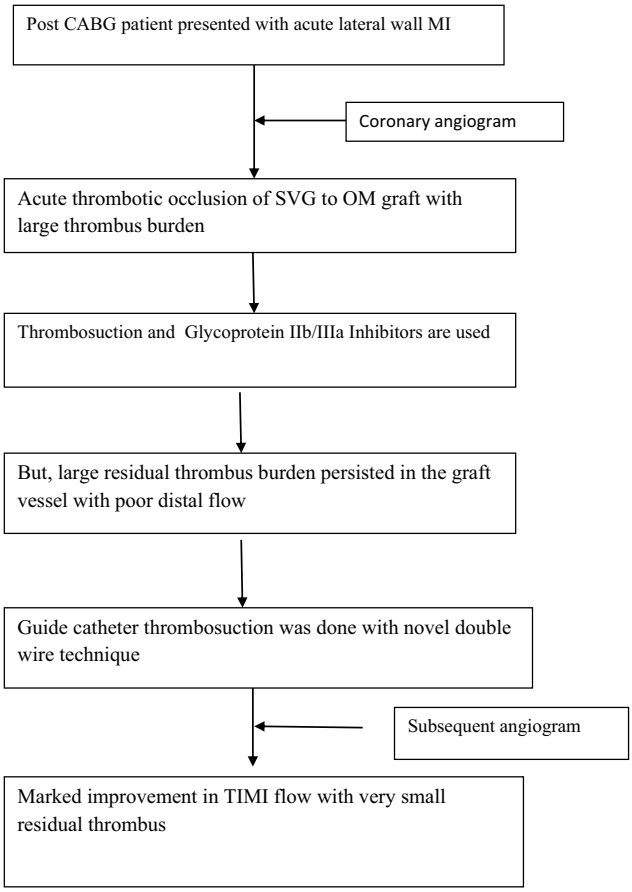
Introduction

Percutaneous coronary intervention (PCI) of the saphenous vein graft (SVG) is challenging and associated with poor outcomes.[1] Saphenous vein graft lesions are frequently complex and have a large amount of friable thrombus. These often lead to extensive dissection, severe distal embolization resulting in no reflow or slow flow, and consequently adverse outcomes.[2] We report a case of successful primary PCI in the SVG performed using guide catheter thrombosuction with double wire technique.

Summary figure



Case presentation

A 60-year-old diabetic, hypertensive, and non-smoker male presented to our emergency at odd hours with 3 h chest pain. He had a history of coronary artery bypass grafting 10 years ago, with left internal mammary artery graft (LIMA) to the left anterior descending artery (LAD) and SVGs to an obtuse marginal (OM), to the right posterior descending artery (RPDA), and to the ramus intermedius (RI) artery. On presentation, his blood pressure was 132/84 mmHg with a pulse rate of 120 b.p.m., respiratory rate of 20 breaths/min, and random blood sugar of 172 mg/dL. The general physical and cardiovascular examinations did not reveal any specific findings. His electrocardiogram showed ST segment elevation in leads I, aVL, V_5, and V_6 indicative of lateral wall myocardial infarction (MI) (*Figure 1*). Bedside echocardiography showed new regional wall motion abnormalities (RWMA) in the posterolateral wall with left ventricular ejection fraction (LVEF) of 50%. His previous echocardiography report showed normal LVEF without any RWMA. The patient received loading dose of 325 mg of aspirin and 180 mg of ticagrelor. He was immediately transferred to the cardiac catheterization laboratory for coronary angiography (CAG).

Coronary angiography revealed severe disease in native coronary arteries with occluded LAD and RCA and diffusely diseased OM and RI. Angiography of graft vessels showed patent LIMA to LAD, SVG to RI, and SVG to RPDA and acute thrombotic occlusion of the SVG to the OM graft (*Figure 2A*) (see supplementary material online, *Video S1*). In view of ongoing chest pain and haemodynamic instability (blood pressure of 90/64 mmHg), we decided to perform primary PCI of the SVG to the OM.

The SVG graft was engaged with 6 Fr Judkins right (JR) guiding catheter (Medtronic, Minneapolis, USA). The lesion was crossed with a hydrophilic 0.014' guidewire (HI-TORQUE WHISPER ES Guide Wire™ Abbott Vascular, IL, USA). Abciximab was

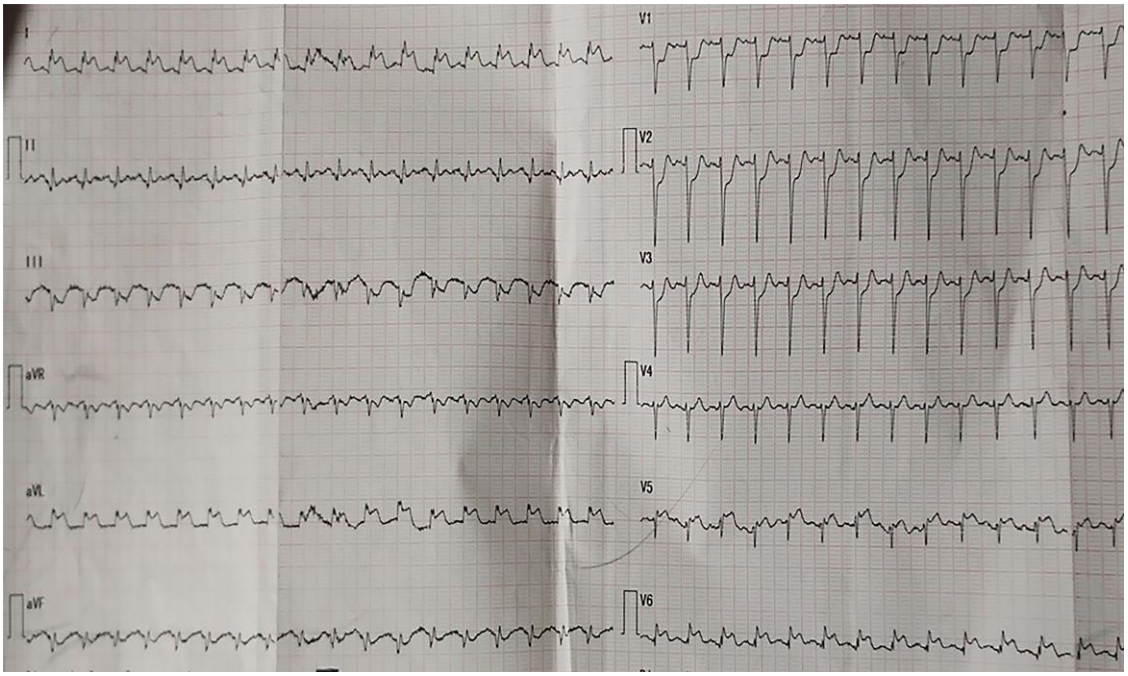


Figure 1 Electrocardiogram at the time of presentation.

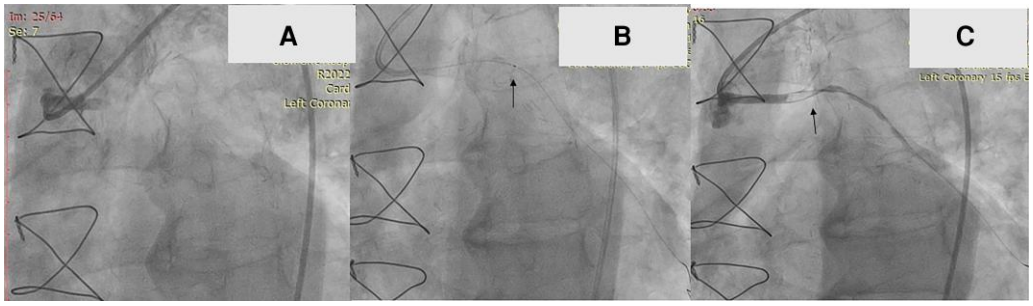


Figure 2 (*A*) Angiogram revealed complete thrombotic occlusion of the saphenous vein graft to an obtuse marginal. (*B*) Thrombosuction using thrombus aspiration catheter (arrow). (*C*) Angiogram showed larger thrombus burden (arrow) despite using thrombus aspiration catheter.

administered 0.25 mg/kg IV bolus followed by infusion of 0.125 mcg/kg/min. In view of the large thrombus burden, thrombosuction was carried out with a thrombus aspiration catheter (Export Advance™ Medtronic, Minneapolis, USA) (*Figure 2B*) (see supplementary material online, *Video S2*). Despite pharmacologic and mechanical tools, there was a large residual thrombus burden in the vessel with poor distal flow (*Figure 2C*) (see supplementary material online, *Video S3*). Due to the deteriorating condition of the patient and unavailability of any other modality, we decided to perform guide catheter thrombosuction. One exchange length floppy tip wire 0.014' (Boston Scientific, Inc, Maple Grove, Minnesota) was passed alongside the pre-existing WHISPER wire, and the 6 Fr JR guiding catheter was changed to a less traumatic 5 Fr JR guiding catheter over the exchange length floppy wire (*Figure 3A and B*). Anticipating the possibility of dissection and difficult rewiring of the vessel, following guide thrombectomy, the WHISPER wire was kept distally in the vessel along the guiding catheter to maintain the access to the graft vessel.

The 5 Fr JR guiding catheter was slowly advanced over the wire to the distal of the graft, and the floppy wire was removed (*Figure 3C*) (see supplementary material online, *Video S4*). The hub of the guide catheter was disconnected from the Y-connector and a 20 mL Luer-Lok syringe (Becton Dickinson) was attached. Maintaining a constant and moderate negative suction, the guide catheter was slowly withdrawn from the artery and out of the femoral sheath. A large amount of thrombus was detected following flushing of the catheter (*Figure 3D*). While all this was done, the WHISPER wire was in the graft to ensure access to the distal graft vessel. There was dramatic improvement in clinical condition of the patient with

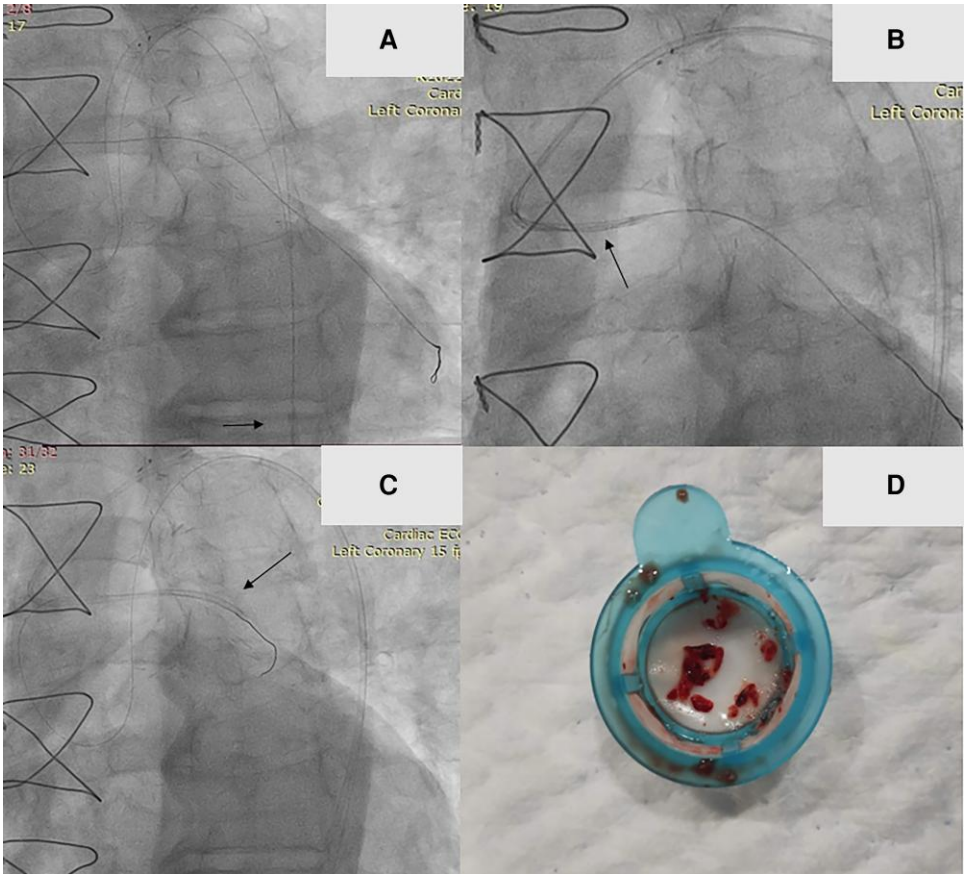


Figure 3 Safe removal of the 6 Fr JR guide catheter with exchange for a 5 Fr JR guide catheter while maintaining a wire in the distal segment of the saphenous vein graft (SVG) along the guide catheter. (*A*) The 6 Fr JR guide catheter (arrow) was removed. (*B*) A 5 Fr JR guide (arrow) was advanced over the exchange length floppy wire. (*C*) The guide catheter (arrow) thrombosuction into the SVG. (*D*) A large amount of thrombus material following flushing the catheter.

stabilization of haemodynamic status. The 6 Fr JR guide was then advanced over the WHISPER wire and the vessel was engaged (*Figure 4A*). Subsequent angiogram revealed marked improvement in TIMI flow with very small residual thrombus (*Figure 4B*) (see supplementary material online, *Video S5*). The culprit lesion at the proximal SVG graft had significant stenosis. The lesion was stented with a sirolimus-eluting stent Ultimaster (Terumo, Tokyo, Japan) 3.0 × 38 mm at 9 atm (*Figure 4C*). The final angiogram showed TIMI 3 flow in the vessel (*Figure 4D*) (see supplementary material online, *Video S6*). The course of hospital stay was uneventful. The patient was discharged on Day 4 with aspirin 75 mg once daily and ticagrelor 90 mg twice daily as dual antiplatelet therapy, atorvastatin 40 mg once daily, and telmisartan 40 mg once daily along with oral hypoglycaemic agents.

Discussion

The incidence of major adverse cardiac events after primary PCI in SVGs is remarkably higher than other vessels.[3] Saphenous vein grafts have a tendency of slow flow because they are large diameter vessels anastomosed to smaller, native coronary arteries. Moreover, SVG lesions are often very friable and have a very thin fibrous cap with a large thrombotic burden.[4] These peculiarities might cause distal embolization of athero-thrombotic debris that makes it challenging to achieve a good TIMI flow.[5]

Primary PCI in such cases is challenging and often associated with an increased risk of intraoperative complications like slow flow, no reflow, and fatal arrhythmias and mortality. Although routine manual thrombosuction has not shown to be beneficial, in a subgroup analysis of cases with high thrombus burden, a bailout treatment strategy of thrombus aspiration showed favourable outcomes.[6] We did not use an embolic protection device in the present case. The utility of embolic protection devices during the primary PCI of SVG lesions has failed to show any benefit.[7]

In the present case, appropriate pharmacotherapy and thrombosuction failed to provide the desired result in a clinically deteriorating patient with occluded SVG with a large thrombus burden. In such a difficult situation, guide catheter thrombosuction was used as a bailout strategy to salvage the patient. Manual thrombus aspiration catheters have smaller internal diameter (ID) of 0.041' and often result in inadequate thrombus removal or clot migration resulting in risk of thromboembolism. Direct thrombus aspiration with guide catheter following deep coronary intubation helps in removing a very large amount of thrombus because of their larger internal lumen (IDs of 6 Fr and 5 Fr catheter are 0.071' and 0.058', respectively) as

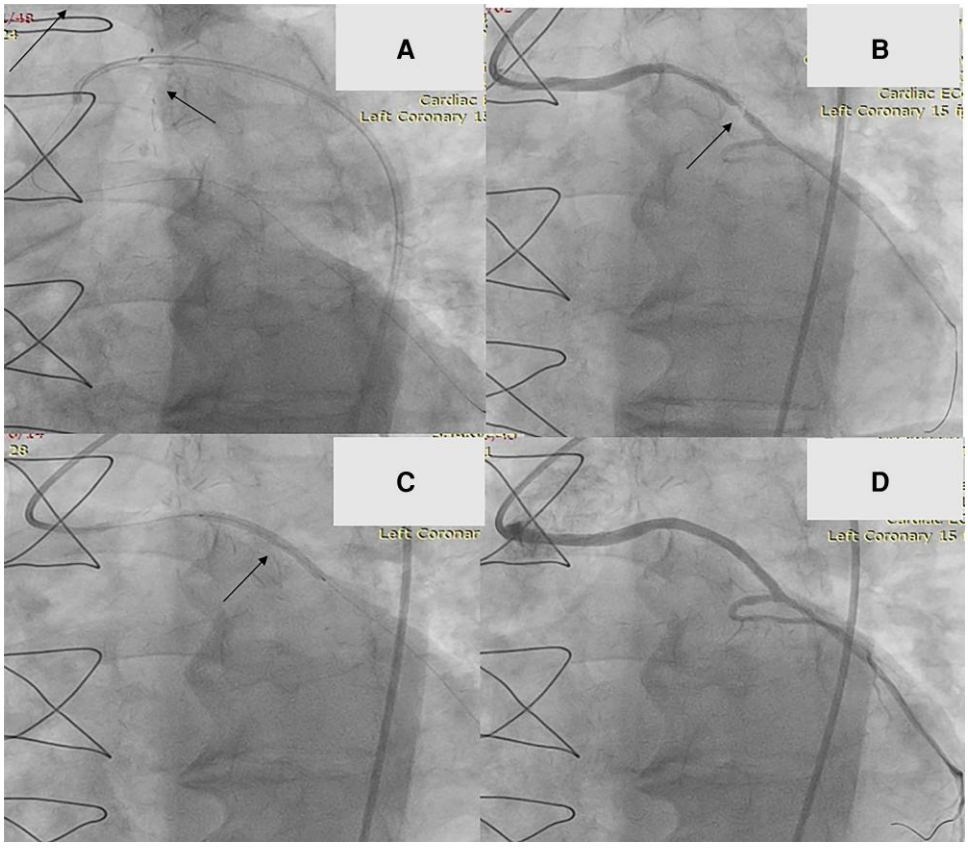


Figure 4 (*A*) Finally, the 5 Fr guide catheter was removed and exchanged with a 6 Fr JR guide catheter (arrow) over the WHISPER wire which was kept distally in the graft vessel. (*B*) Angiogram revealed a very small amount of residual thrombus (arrow) following guide catheter thrombosuction. (*C*) A drug-eluting stent was implanted (arrow) at the proximal SVG lesion. (*D*) Angiographically success result.

compared with conventional aspiration catheter.[8] However, the guide catheter suction is associated with significant risks. It may cause endothelial damage, coronary artery dissections, and even collapse of the distal vessel.[9] We therefore used a simple double wire technique to avoid these complications and achieve successful reperfusion. This double wire technique is an effortless and novel way to maintain access to the distal vasculature of the occluded artery, while the guide can be safely intubated deep into the coronary artery depending upon the thrombus burden.[10] Even if the dissection occurs or the distal vessel collapses, the presence of a wire in the vessel will ensure prompt and true access to the lumen of the coronary artery. In the present case, the catheter was aligned almost straight on the graft, so the large thrombus could be extracted without major injury to the vessel wall. The use of a soft-tip guiding catheter and its cautious advancement over the wire prevented any catheter-induced trauma or dissection of the vessel. In addition, maintaining continuous negative suction on the syringe while withdrawing the guiding catheter out of the sheath minimized the risk of systemic embolization. We avoided pre- and post-dilatation and the stent was deployed at nominal pressure.

Conclusion

This case demonstrates the feasibility of using guide catheter thrombus aspiration with a simple double wire *in situ* to restore circulation in the occluded graft vessel with a large thrombus burden as a bailout measure.

Lead author biography

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Supplementary material

Supplementary material is available at *European Heart Journal – Case Reports* online.

Consent: Written informed consent was obtained from the patient.

Conflict of interest: None declared.

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Data availability

The data underlying this article are available in the article and its online supplementary material.

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