

Thrombotic Complication of COVID-19: A Case Report of Acute Saphenous Vein Graft Thrombosis in a Newly Diagnosed Patient

COVID-19'un Trombotik Komplikasyonu: Yeni Tanılı Hastada Akut Safen Ven Greft Trombozu

CASE REPORT OLGU SUNUMU

ABSTRACT

A 63-year-old man with active COVID-19 infection and a history of coronary artery bypass grafting presented with acute thrombotic occlusion of saphenous venous graft which was anastomosed to the left anterior descending artery. Initial antegrade approach, complicated by a small leakage in the distal left anterior descending artery, was later converted to a retrograde approach via occluded saphenous vein graft. After successful stenting, TIMI 3 flow was achieved.

Keywords: Myocardial infarction, COVID-19, thrombosis

ÖZET

63 yaşında aktif COVID-19 enfeksiyonu ve koroner arter baypas greftleme öyküsü bulunan hasta sol anterior inen artere greftlenmiş safen venöz greftin akut trombotik oklüzyonu ile başvurdu. Öncelikle denenen antegrad yaklaşım, distal sol anterior inen arterde küçük ekstrasvazasyon ile komplike olduktan sonra, oklüde safen venöz greft üzerinden retrograd yaklaşıma dönüştürüldü. Başarılı stentleme sonrasında TIMI 3 akım sağlandı.

Anahtar kelimeler: Miyokart enfarktüsü, COVID-19, tromboz

COVID-19 caused by SARS-CoV-2 is a global health problem that was first identified in Wuhan, China, and spread all over the world in a short time. COVID-19 may cause predisposition to venous and arterial thromboembolism due to extreme inflammation, hypoxia, immobilization, and diffuse intravascular coagulation.¹ We present a 64-year-old patient with saphenous vein graft thrombosis conceived to be caused by COVID-19 who was admitted to the emergency room with ST-elevation myocardial infarction.

Case Report

A 63-year-old gentleman with a history of coronary artery bypass graft 12 years ago, who had been diagnosed with COVID-19 after demonstrating flu-like symptoms 3 days ago, was admitted with ST-elevation myocardial infarction. The patient provided written informed consent. Personal protective equipment which included, N95 masks, surgical caps, double-gloves, and face shields were mandatory for all personnel. Diagnostic coronary angiography performed via the right femoral artery revealed an occluded native left anterior descending (LAD) artery at the ostium (Figure 1). The saphenous vein graft implementation to the LAD artery was thrombotic, degenerated, and totally occluded in the distal segment. The flow of the graft was compromised by a huge thrombus. Radial artery bypass graft to the diagonal branch was patent. Considering the long-term results, it was decided to revascularize the LAD chronic total occlusion (CTO) lesion. After an intravenous heparin bolus, the native LAD was intubated with a 7F EBU 4.0 (Launcher, Medtronic, USA) guiding catheter. Thereafter, a Pilot 200 (Abbott, Abbott Park, IL, USA) guidewire was advanced distally over a microcatheter and sequential balloon dilatation was performed (although contralateral injection was not possible due to graft occlusion), which unfortunately resulted in a small leak in the distal LAD, requiring balloon inflation at the proximal LAD to control the bleeding

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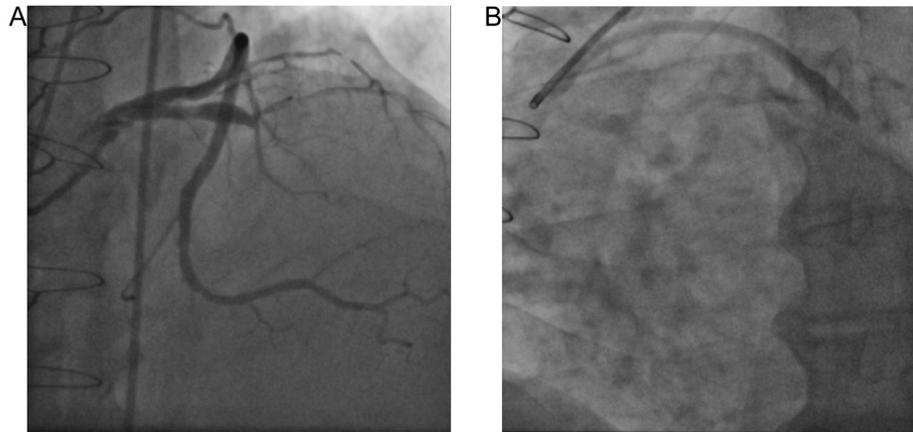


Figure 1. (A) Left coronary angiography. Left anterior descending artery is occluded proximally. (B) Saphenous vein graft angiography depicts thrombotic occlusion.

(Video 1*). Shortly thereafter leakage stopped. Subsequently, a strategy switch to a retrograde route was decided. The saphenous vein graft (SVG) was intubated with a 6Fr JR4 (Launcher, Medtronic (Minneapolis, Minnesota, USA)) guiding catheter via the left femoral artery. The wire and a microcatheter were advanced, crossing LAD lesion, however, due to deformation of the only available externalization wire, a floppy wire was advanced via antegrade microcatheter into retrograde microcatheter by an end-to-end lining of both microcatheters (Figure 2). Thereafter the antegrade guidewire was advanced distally and the procedure was continued via this route. A 3.0 × 28 mm drug-eluting stent (Promus, Boston Scientific (Marlborough, Massachusetts, USA)) was implanted distally. Then, a 4.0 × 30 mm drug-eluting stent (Resolute, Medtronic) was implanted with minimal overlap with the first stent. TIMI 3 flow was observed in the control angiographic image (Figure 3). The patient received a dual antiplatelet (DAPT) regimen consisting of aspirin and ticagrelor as recommended by current guidelines, and low molecular weight heparin for 2 weeks.

Discussion

COVID-19, like other viral infections, can cause various cardiovascular complications including myocarditis, bradyarrhythmia, tachyarrhythmia, heart failure, sudden cardiac death, and acute coronary syndrome (ACS), and these complications can increase mortality.³⁻⁵ Cases of ACS with thrombosis in native coronary arteries have been described.^{6,7} The cytokine storm caused by COVID-19 pneumonia creates a thrombotic process by triggering endothelial dysfunction and inflammatory cascades.^{1,3,8} Although the specific mechanism is unknown, the risk of venous thrombosis is high in patients who have been diagnosed with COVID-19 and have a severe elevation in D-dimer and fibrinogen levels; thus, prophylactic treatment is recommended.^{2,9} Cases of pulmonary thromboembolism, deep venous thrombosis, portal vein thrombosis, and

priapism associated with COVID-19 have been described in the literature.¹⁰ To the best of our knowledge, this is the first case described in the literature presenting with SVG thrombosis associated with COVID-19.

A lower initial success rate and a higher complication rate are associated with coronary angioplasty of totally occluded vein grafts compared to angioplasty of vein grafts with subtotal stenosis and native coronary arteries. It is unclear whether effective angioplasty improves clinical outcomes or not.¹¹ Compared with patients who have native vessel culprit, AMI patients who have an SVG culprit have low long-term survival after mechanical reperfusion. Albeit it may be able to restore TIMI 3 flow in a reasonably high proportion of patients with acute SVG total occlusion, the success rate is lower compared to angioplasty of

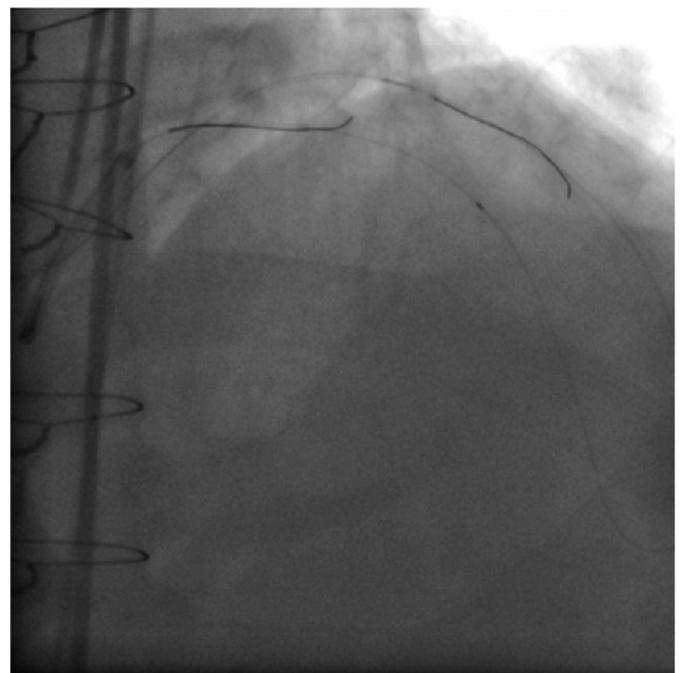


Figure 2. A 0.014-inch guidewire is retrogradely advanced with a microcatheter.

ABBREVIATIONS

ACS	Acute coronary syndrome
DAPT	Dual anti-platelet
LAD	Left anterior descending

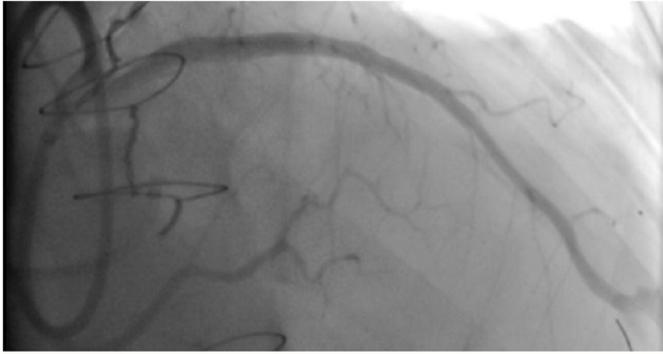


Figure 3. Final angiographic result after native left anterior descending artery stenting.

native vessels and this may be responsible for the late mortality in this category.¹² Further argument against the intervention of occluded SVGs due to COVID-19 mediated thrombosis comes from increased thrombotic burden in later.⁷ Considering these facts, attempting native vessel revascularization should be the first-line approach, as was done in our case. A strategy switch to a retrograde approach was further complicated by the deformation of the only available externalization wire. This was addressed by lining up an antegrade microcatheter and the retrograde microcatheter proximal to the CTO lesion and fortunately an antegrade guidewire could be inserted into the retrograde microcatheter.

Management of thrombotic coronary complications during COVID infection may have some differences. Firstly, a potent anti-platelet such as ticagrelor or prasugrel should be instituted in the DAPT regimen, as per guidelines. A GP3b2a inhibitor may be considered; however, a leakage in our case, precluded this therapy. Also, anticoagulant therapy after primary PCI, and upon removal of femoral sheaths (if present) should be (re-)instituted. The duration of anticoagulant treatment is currently unknown, and we have empirically recommended 2 weeks, or until the end of the active infection.¹³

Conclusion

The prothrombotic milieu of COVID-19 infection may facilitate acute thrombotic SVG occlusion, where revascularization of the native vessel should be attempted first. In case of a CTO revascularization, appropriate equipment, and operator experience is paramount.

*Supplementary video files associated with this article can be found in the online version of the journal.

Informed Consent: Informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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