

CASE REPORT

BEGINNER

CLINICAL CASE

Repeat Revascularization for Severe Recurrent Coronary Artery Disease in a Young Woman With Takayasu Arteritis



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ABSTRACT

A young woman with Takayasu arteritis presented with an acute coronary syndrome with ostial left main coronary artery stenosis. She underwent urgent coronary artery bypass surgery but developed recurrent symptoms 6 months later owing to graft failure. She was treated with percutaneous coronary intervention with resolution of her symptoms. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2020;2:77-81) © 2020 Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 17-year-old female patient with recently diagnosed Takayasu arteritis complicated by left main coronary artery (LMCA) stenosis requiring coronary artery

bypass grafting (CABG) presented with recurrent chest pain 6 months later.

The patient was initially diagnosed with Takayasu arteritis in the setting of chest pain, elevated inflammatory markers, and aortic wall thickening and dilation on cross sectional imaging. She was treated with corticosteroids but subsequently presented with an acute coronary syndrome. Coronary angiography revealed ostial total occlusion of the LMCA, ostial right coronary artery (RCA) stenosis (60%), and right-to-left collaterals (**Figure 1, Videos 1 and 2**) with evidence of aortic ulceration. After multidisciplinary discussion, she underwent urgent replacement of the ascending aorta and CABG with left internal mammary artery (LIMA) to obtuse marginal, right internal mammary artery (RIMA) to left anterior descending artery (LAD), and saphenous vein graft (SVG) to RCA. Aortic pathology revealed significant inflammation, focal granulomatous features, and intimal thickening, consistent with Takayasu arteritis.

LEARNING OBJECTIVES

- Young female patients with Takayasu arteritis are at risk for developing ostial coronary stenosis.
- Patients may require coronary revascularization, typically with coronary artery bypass grafting, but are at increased risk for graft failure, and percutaneous coronary intervention may be an appropriate means of reintervention.
- A multidisciplinary approach with cardiology, cardiac surgery, and rheumatology is crucial to optimizing treatment in these patients.

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Informed consent was obtained for this case.

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**ABBREVIATIONS
AND ACRONYMS****CABG** = coronary artery bypass grafting**DES** = drug-eluting stent**LAD** = left anterior descending coronary artery**LIMA** = left internal mammary artery**LMCA** = left main coronary artery**PCI** = percutaneous coronary intervention**RCA** = right coronary artery**RIMA** = right internal mammary artery**SVG** = saphenous vein graft

After recovering well initially, she developed new exertional chest pain 6 months later. Physical examination revealed normal vital signs; healed sternotomy scar; regular heart sounds without murmurs, rubs, or gallops; clear lungs; and no evidence of volume overload.

PAST MEDICAL HISTORY

The patient had no other pertinent past medical history.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis included acute coronary syndrome, bypass graft failure, spontaneous coronary artery dissection, myopericarditis, aortic dissection, large-vessel vasculitis flare, and pulmonary embolism.

INVESTIGATION AND MANAGEMENT

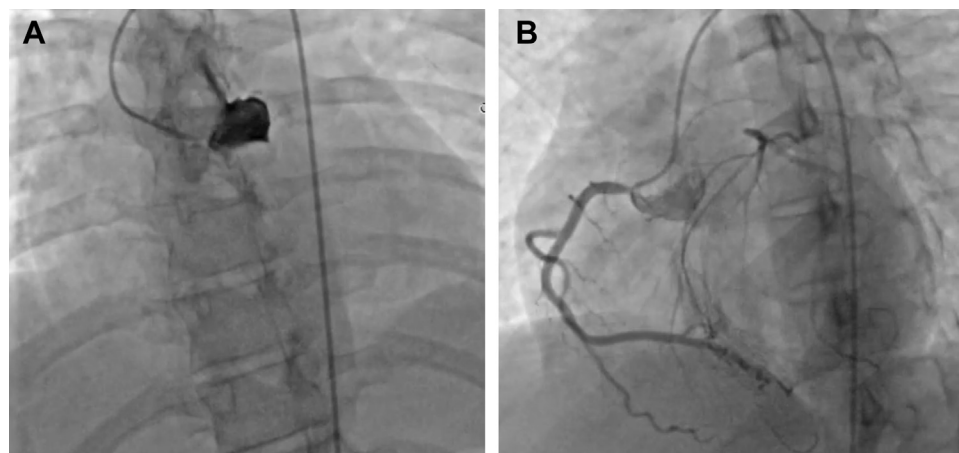
Repeat assessment of inflammatory markers was normal (erythrocyte sedimentation rate 2, C-reactive protein <0.3 mg/l). Cardiac positron emission tomography stress testing demonstrated transient ischemic dilatation with significant reversible defects in the anterior, apical, septal, lateral, basal, and inferolateral walls (summed difference score of 23). Coronary angiography demonstrated occlusion of the SVG to RCA, 70% stenosis of the distal anastomosis of

LIMA to obtuse marginal, and 70% stenosis of the distal anastomosis of RIMA to LAD involving the native LAD (**Figure 2**). Owing to the rapid development of anastomotic lesions with significant ischemia and limited surgical options due to prior mammary and SVG grafting, she was treated with percutaneous coronary intervention (PCI).

The LMCA total occlusion was crossed through a retrograde approach using the LIMA as a conduit. The retrograde wire was externalized and the LMCA lesion was serially dilated from an antegrade approach. Zotarolimus-eluting stents were implanted in the LMCA and optimized under intravascular imaging guidance. Given the appearance of LAD stenosis at the RIMA anastomosis, instantaneous wave-free ratio was performed and confirmed residual ischemia (instantaneous wave-free ratio value of 0.82). Balloon angioplasty of the LAD near the anastomotic site was performed with an adequate result without stenting (**Figure 3**).

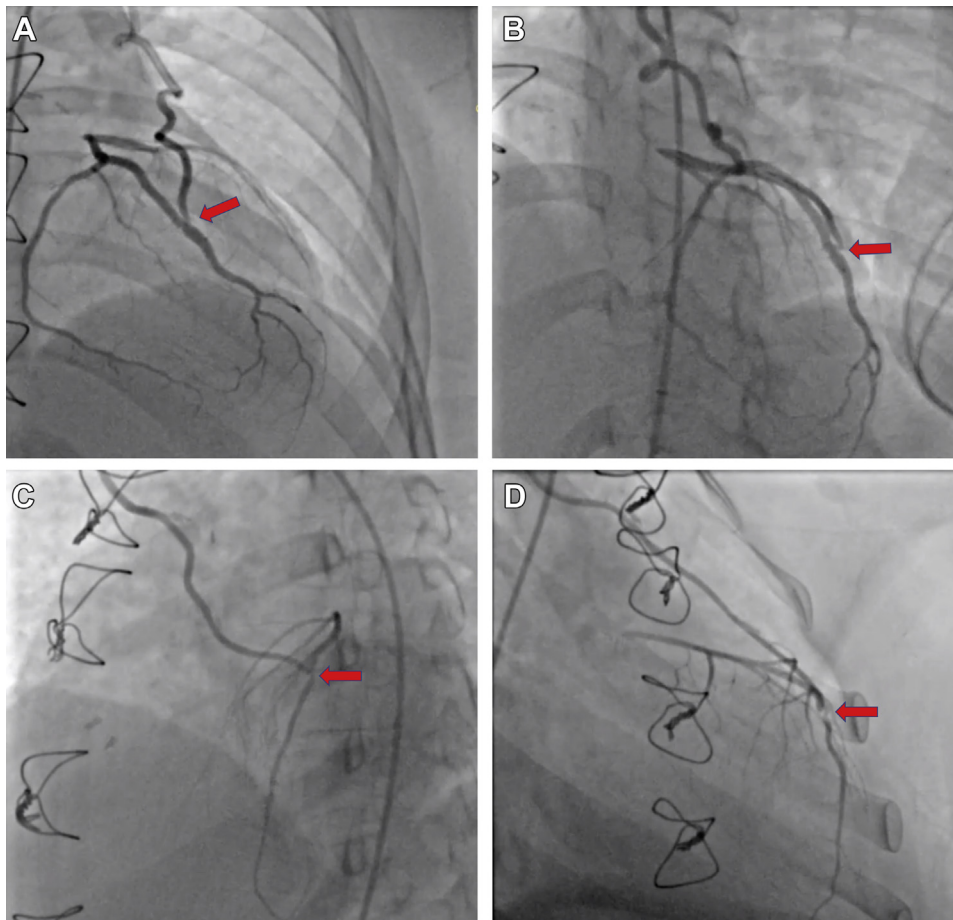
DISCUSSION

This report describes a young woman with Takayasu arteritis who underwent replacement of the ascending aorta and CABG for left main coronary artery occlusion and subsequently presented with early graft failure treated with complex PCI. Takayasu arteritis is a chronic granulomatous large-vessel vasculitis affecting the aorta and its main branches, with the majority of cases affecting young women (1).

FIGURE 1 Severe Ostial Coronary Artery Disease

Coronary angiography demonstrated (A) total occlusion of the ostial left main coronary artery (**Video 1**) and (B) 60% ostial stenosis of the proximal right coronary artery, with filling of the left coronary system via right to left collaterals (**Video 2**).

FIGURE 2 Development of Graft Disease



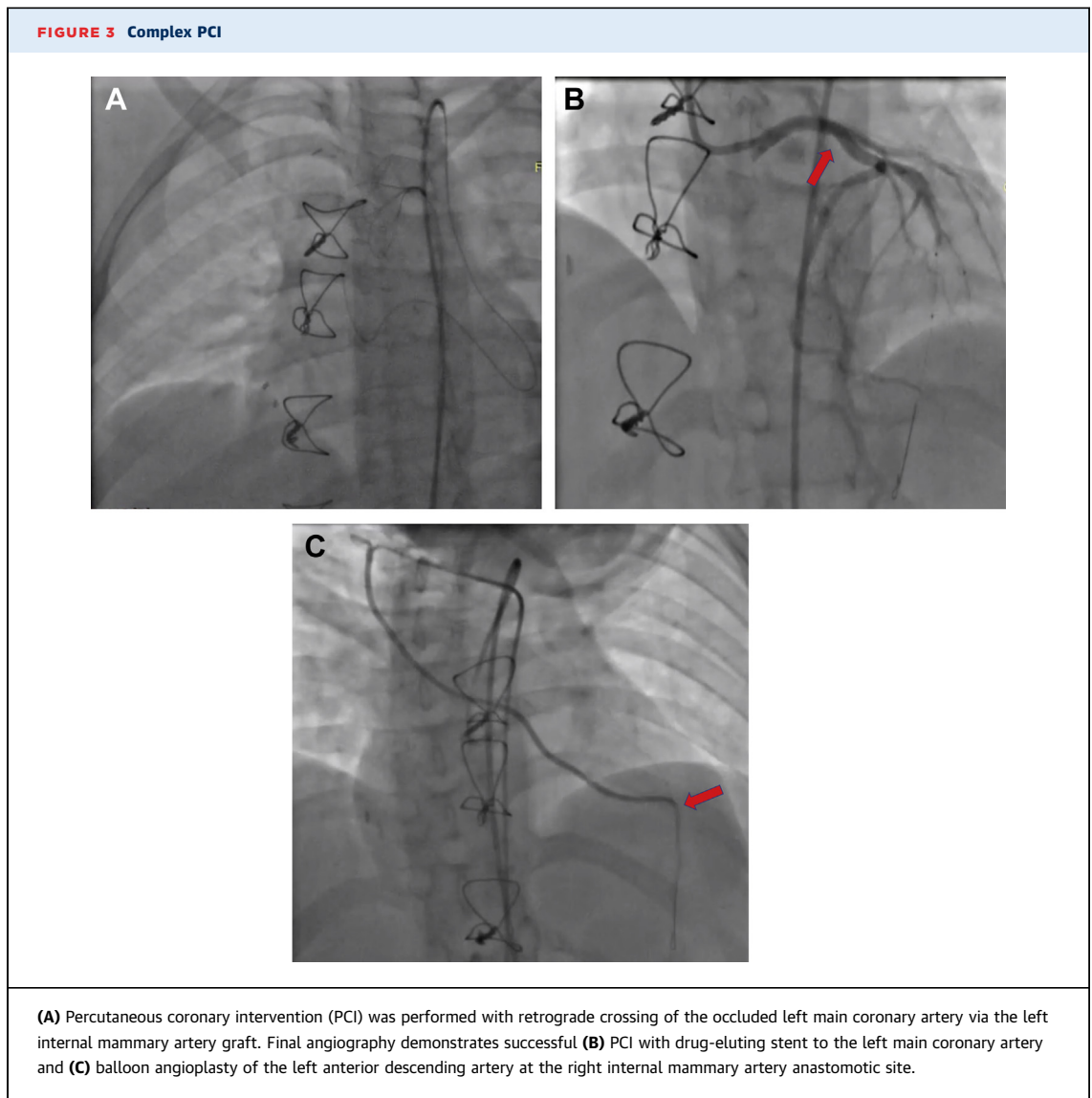
Coronary angiography in multiple projections revealed (A, B) 70% stenosis of the distal anastomosis of the left internal mammary artery to the obtuse marginal and (C, D) 70% stenosis of the distal anastomosis of the right internal mammary artery to the native left anterior descending artery.

Coronary involvement may occur in 10% to 30% of cases, typically with ostial stenosis, though coronary arteritis and aneurysms have been reported (2-4). In conjunction with immunosuppressive therapy, CABG is generally considered the optimal means of revascularization (4), especially when other cardiovascular surgery is indicated.

Several prior reports describe individuals with Takayasu arteritis requiring repeat revascularization procedures after CABG owing to occlusion of proximal aspects of arterial and venous bypass grafts (1,5,6), particularly in the setting of active inflammation. These reports suggest that graft restenosis rates are higher in Takayasu's than in typical atherosclerotic disease (6,7). Reanastomosis using synthetic graft material at the aortic insertion site has been

suggested as a means of avoiding extension of aortic inflammation to bypass grafts during disease flares (3). Additionally, other special surgical techniques such as CABG directly to LMCA, ostial endarterectomy, and hybrid revascularization have been described (7).

The current case is notable for the development of recurrent ischemia owing to subacute arterial graft failure at the distal arterial graft anastomotic sites and involving the native LAD. It is possible that this was due to surgical injury in the setting of an active inflammatory milieu. As both internal mammary arteries had already been grafted and the patient had experienced early SVG failure, options for reoperative CABG were limited, and PCI was chosen for revascularization.



LMCA stenting has been described as a primary intervention in Takayasu arteritis, particularly in patients who are poor surgical candidates due to active inflammation or compromise of potential arterial conduits (8,9). However, restenosis rates after PCI have been >50% in some reports, albeit with limited data or long-term follow-up in the era of contemporary drug-eluting stents (DES) (6,8-10). In the current case, the LMCA was treated with a DES, but the LAD at the RIMA anastomosis was managed with balloon angioplasty alone owing to uncertainty regarding the risk of restenosis and a desire to preserve future revascularization options.

Though various revascularization strategies for both early and late graft failure in Takayasu arteritis have been reported, we believe that this case is a

unique example of distal arterial graft failure treated with PCI of the LMCA and the LAD anastomotic site. This case suggests that PCI may be a therapeutic option for recurrent coronary ischemia due to graft failure in patients with Takayasu arteritis and highlights the need for additional case experience and long-term follow-up to establish the optimal patient selection and durability for this approach.

FOLLOW-UP

Six months after PCI, the patient had not had any further chest pain. She declined repeat coronary angiography, but an exercise stress echocardiogram demonstrated normal systolic function and no evidence of ischemia (81% of maximal predicted heart

rate). Magnetic resonance angiography of the chest, abdomen, and pelvis showed no active vasculitis. Current medications included aspirin, ticagrelor, prednisone, methotrexate, and tocilizumab.

CONCLUSIONS

Although patients with Takayasu arteritis are generally young women, they are at risk for development of coronary stenosis, which typically occurs in the ostial main coronary arteries. Though surgical revascularization has been generally preferred in this young patient population, graft failure is not uncommon and presents a unique therapeutic challenge. In the

present patient, graft failure occurred with an unusual mechanism consisting of stenosis at the distal anastomoses of internal mammary artery bypass grafts. PCI offered a safe and effective means of revascularization after bypass graft failure, and further study is warranted to determine the durability of this approach.

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KEY WORDS coronary artery bypass, percutaneous coronary intervention, vascular disease

APPENDIX For supplemental videos, please see the online version of this paper.