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BEGINNER

CASE REPORT: CLINICAL CASE

Takayasu Arteritis With Extensive Cardiovascular, Neurovascular, and Mesenteric Involvement

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ABSTRACT

Takayasu arteritis is a rare large vessel vasculitis with an incidence of 1 to 3 per million. This disease typically involves the aorta and its primary branches but has been found to involve the coronary arteries in 7% to 9% of cases. We highlight the need for prompt diagnosis and treatment. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2020;2:697–701) © 2020 The Authors. 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/).

A 33-year-old man was recently diagnosed with Takayasu arteritis (TA) after a 1-year history of postprandial abdominal pain, a 40-pound unintentional weight loss, and moderate renal insufficiency. Computed tomography imaging at that time revealed significant mural thrombosis and stenosis of the aortic arch and great vessels (**Figures 1A and 2A**), severe stenosis of the distal aorta with involvement of the mesenteric arteries, and bilateral renal artery stenosis (**Figure 3**). His symptoms improved with high-dose prednisone (40 mg/day for 2 weeks, 30 mg/day for 2 weeks, and 20 mg/day thereafter), but 4 months later he presented with intermittent confusion and blurry vision.

LEARNING OBJECTIVES

- To recognize the spectrum of findings of Takayasu arteritis for prompt diagnosis and treatment.
- To highlight the incidence of coronary artery involvement in Takayasu arteritis and how this presents a therapeutic challenge.

PAST MEDICAL HISTORY

The past medical history included hypertension, chronic kidney disease, and multivessel TA.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis included acute ischemic stroke, central nervous system infection, vasculitis, carotid artery stenosis, and coronary artery disease.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: Case Reports* author instructions page.

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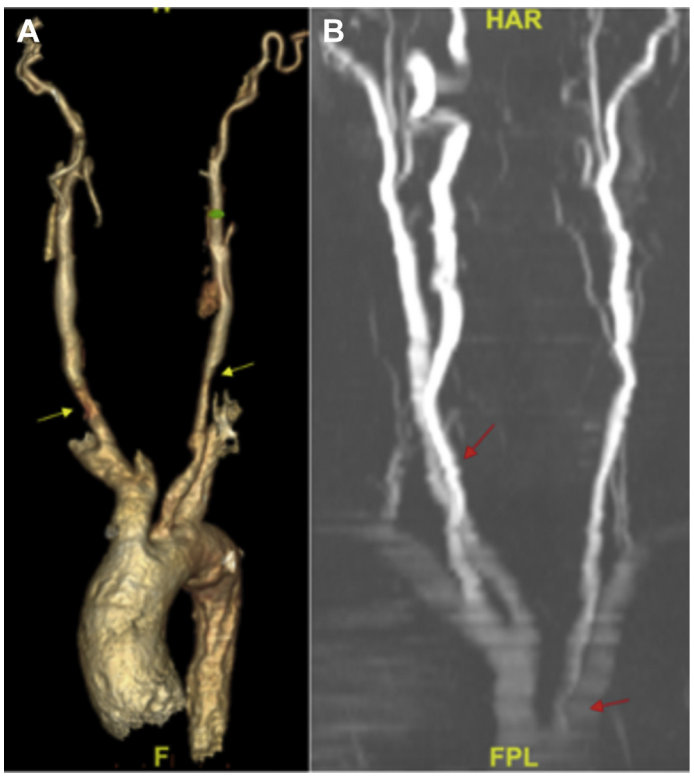
ABBREVIATIONS AND ACRONYMS

TA = Takayasu arteritis

INVESTIGATIONS

In the emergency room, he was afebrile with stable vital signs. Magnetic resonance imaging revealed a new subacute infarct in the right posterior cerebral artery distribution. Magnetic resonance angiography disclosed near complete occlusion of both carotid arteries with extensive collateral formation. Initial work-up also revealed an elevated troponin of 19.3 ng/ml and ischemic electrocardiogram changes despite no angina. Additional blood tests including antinuclear antibodies, antineutrophil cytoplasmic antibodies, erythrocyte sedimentation rate, C-reactive protein, and lipid panel were unrevealing. Chest computed tomography and head and neck magnetic resonance angiography showed evidence of disease progression (Figures 1B and 2B). Coronary angiography revealed triple vessel disease with complete occlusion of the ostial left anterior descending artery, proximal and distal left circumflex artery, and mid and distal right coronary artery (Figures 4 and 5).

FIGURE 1 Stenosis of Aortic Arch and Great Vessels



(A) Neck computed tomography with reconstruction of aortic arch and great vessels showing bilateral carotid artery stenosis at time of diagnosis **(yellow arrows)**. **(B)** Magnetic resonance angiography showing bilateral carotid artery stenosis at time of presentation **(red arrows)**.

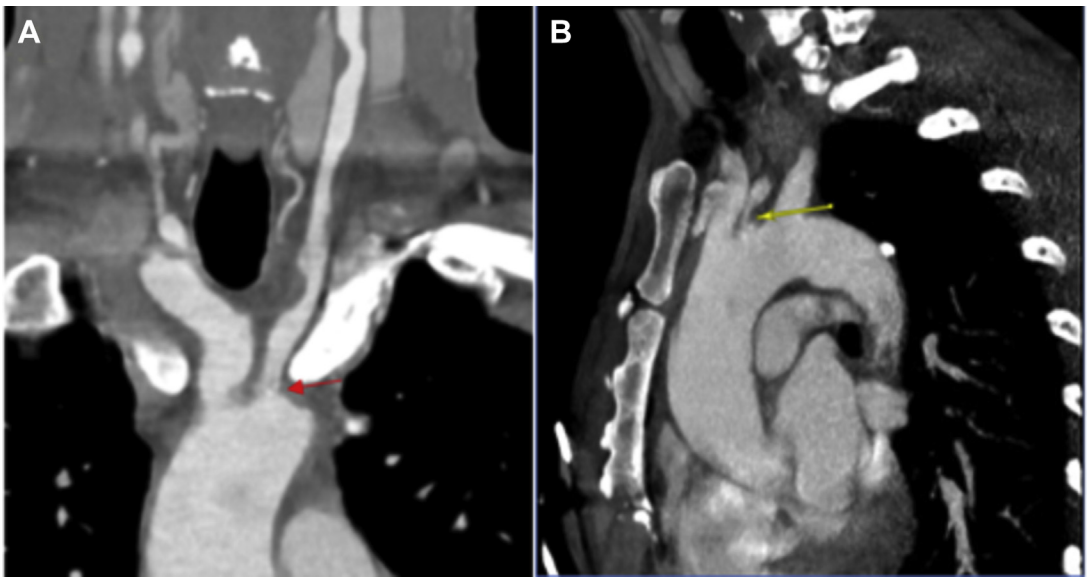
MANAGEMENT

The patient was treated with aspirin, cangrelor, and a heparin drip, with plans for emergent cardiac catheterization. The mid right coronary artery was stented to improve collateral filling of the left anterior descending artery as a temporizing measure, with plans for possible coronary artery bypass grafting. To reduce myocardial demand from persistent tachycardia and hypertension, he was started on nitroglycerin and esmolol drips. He was also started on prednisone 30 mg, with plans to discuss the need for high dose steroids. However, the patient's hospital course was complicated by a jejunal perforation on hospital day 6 that was surgically managed with a partial jejunal resection. His post-operative course was complicated by peritonitis, which was managed with broad-spectrum antibiotics. He later developed dysmetria and worsening confusion for which repeat magnetic resonance imaging revealed extension of his cerebral infarcts to involve the bilateral temporal and occipital lobes as well as the left parietal lobe. After discussion with family, he was transitioned to comfort care and passed on hospital day 17. Autopsy revealed widespread aortic and branching arterial wall thickening and irregularity, confirming the diagnosis of TA. It also revealed significant chronic inflammatory changes involving the coronary arteries (Figure 6).

DISCUSSION

TA is a rare large-vessel vasculitis that affects the aorta and its primary branches. It is a poorly understood, chronic inflammatory disease that predominantly affects young female patients (1–3). The early inflammatory phase involves constitutional symptoms including fevers, chills, night sweats, and arthralgias. The chronic phase involves inflammatory changes of the aorta and its branches, resulting in vascular bruits, claudication, decreased pulses, renovascular hypertension, myocardial and mesenteric ischemia, and neurovascular compromise. Diagnosis is primarily based on the presence of symptoms in the setting of imaging showing disease involvement of the aorta and its main branches (3). Elevated erythrocyte sedimentation rate and C-reactive protein may support the diagnosis; however, one study of 60 TA patients found erythrocyte

FIGURE 2 **Serial CT Imaging Showing Development of Carotid Artery Stenosis**

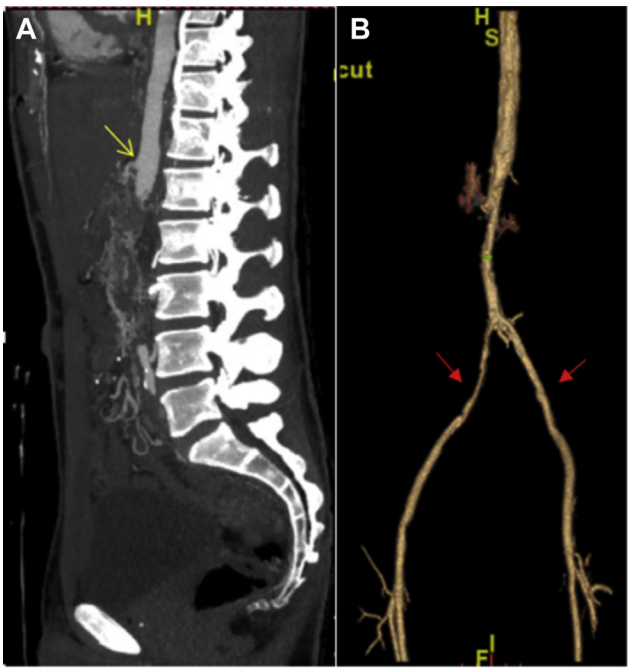


Chest computed tomography at **(A)** time of diagnosis **(red arrow)** showing aortic arch and great vessels and **(B)** time of presentation **(yellow arrow)** showing development of significant narrowing of the left common carotid artery despite glucocorticoid treatment.

sedimentation rate to be normal in 28% of patients with clinically active disease and in 44% of those with disease remission (4). In 1990, the American College of Rheumatology developed diagnostic criteria for TA, with a reported specificity 97.8% and sensitivity of 77% to 90% if a patient demonstrates 3 of 6 characteristics: age of onset before 40 years, extremity claudication, decreased brachial pulse, systolic blood pressure differential of over 10 mm Hg in the arms, a subclavian or aortic bruit, and an abnormal arteriogram. Currently, validation of a broader Diagnostic and Classification Criteria for Vasculitis is underway (5).

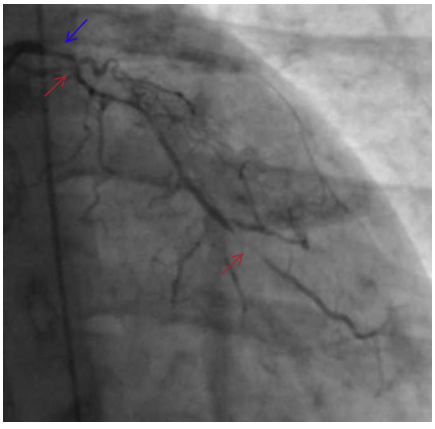
The primary treatment for active disease is high-dose glucocorticoids, while maintenance therapy involves tapering of steroids in combination with immunomodulatory and biologic agents, such as methotrexate or azathioprine (6). Many patients experience relapse or disease progression despite treatment, with estimated relapse rates of ~40% (6). A recent randomized controlled trial of 36 TA patients in remission assigned to placebo or the novel interleukin-6 receptor antagonist tocilizumab showed a trend toward increased time to relapse without reaching significance ($p = 0.0596$) (7). Surgical options for those with vascular

FIGURE 3 **Mesenteric and Iliac Artery Stenosis**



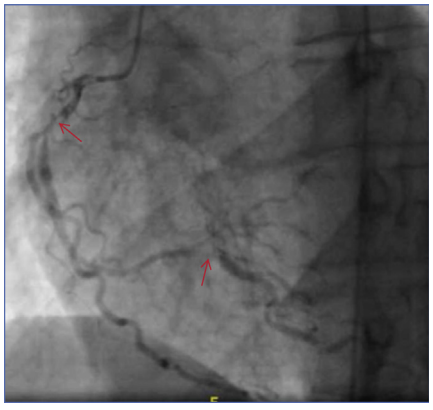
Abdomen and pelvis computed tomography with reconstruction showing **(A)** mesenteric **(yellow arrow)** and **(B)** bilateral iliac arterial involvement **(red arrows)**.

FIGURE 4 Coronary Angiography of Left Coronary Artery Showing Significant Diffuse Sclerosis



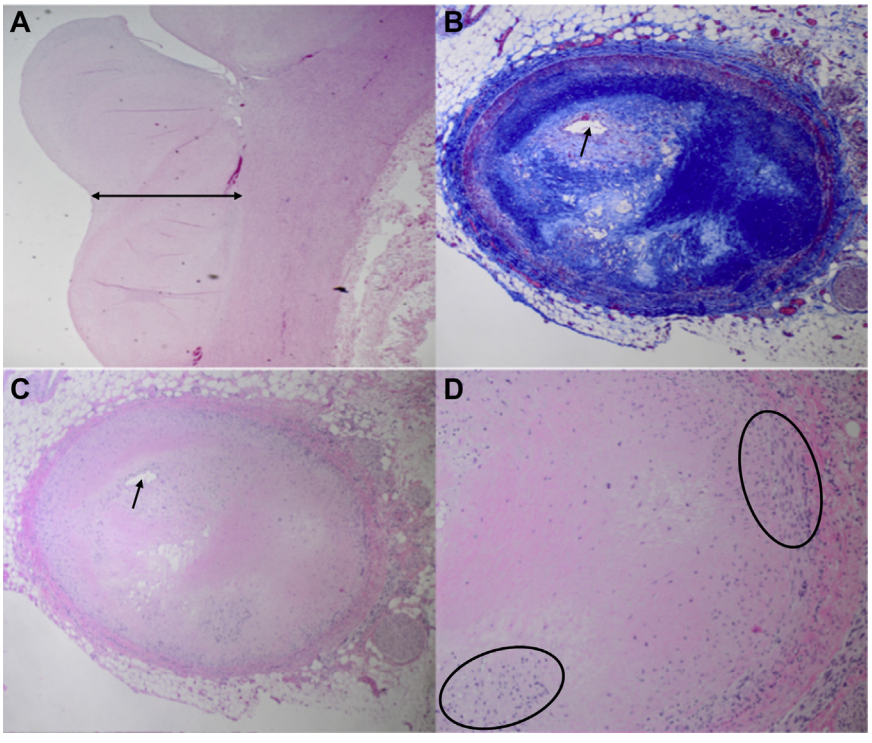
Coronary angiography of left coronary artery showing severe mid to distal left main disease **(blue arrow)**, complete occlusion of the left anterior descending artery, and diffuse ostial and distal left circumflex artery disease **(red arrows)**.

FIGURE 5 Coronary Angiography of Right Coronary Artery Before Stenting Showing Significant Diffuse Sclerosis



Coronary angiography of right coronary artery before stenting showing significant diffuse sclerosis **(red arrows)**.

FIGURE 6 Histology Examination From Autopsy



(A) Aortic wall with marked intimal fibrous thickening without inflammation (**arrow**, hematoxylin and eosin [H&E] stain, original magnification ×2.5), **(B)** left anterior descending artery with fibrous obliteration of lumen (**arrow**, trichrome stain, original magnification ×40), **(C)** serial section of the left anterior descending artery stained by H&E showing absence of inflammation in the fibrous obliteration of the lumen (**arrow**, H&E, original magnification ×40), and **(D)** higher magnification showing only focal chronic inflammatory infiltrate of lymphocytes and macrophages (**ovals**, H&E stain, original magnification ×100).

complications include stenting or bypass grafting, although restenosis in areas of active tissue inflammation poses significant concern. One study reports restenosis in 31.7% of surgical interventions, with decreased incidence when performed after medical therapy or during a quiescent stage of disease (8).

The patient's multiorgan involvement presented a unique diagnostic and therapeutic challenge. Coronary artery involvement is seen in only 7% to 9% of cases and typically results in ostial occlusion, unlike the diffuse triple-vessel stenosis seen in this case (1,9). Treatment can be challenging, as coronary artery revascularization in TA is often unsuccessful due to ostial involvement, active inflammation, and high rates of restenosis (10,11). Although enhanced atherosclerosis has been reported with TA, this was not seen in this patient (10). Autopsy revealed chronic inflammatory changes in the coronary arteries, suggesting that earlier immunosuppression or immunologic therapy may have slowed the progression of disease.

CONCLUSIONS

The diagnosis of TA remains challenging, owing to its indolent nature and nonspecific symptoms, which may belie significant underlying vascular damage. Early diagnosis is essential as immunosuppression may slow disease progression.

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