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CASE REPORT

BEGINNER

CLINICAL CASE

New-Onset Uncontrolled Hypertension and Renal Failure in a Young Woman

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ABSTRACT

This report describes the case of a previously healthy 30-year-old woman who presented with uncontrolled hypertension and renal failure. This case emphasizes the importance of considering renal artery disease. The differential diagnosis for renal artery stenosis is discussed, and the diagnosis and management of Takayasu's arteritis in this patient are highlighted. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2020;2:64–8) © 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/).

HISTORY OF PRESENTATION

A 30-year-old woman presented to the nephrology clinic for a second opinion for uncontrolled hypertension and renal failure. Six months prior to presentation, her primary care physician diagnosed new onset hypertension with a blood pressure of 165/100 mm Hg. She had undergone an evaluation for secondary causes of hypertension by a local nephrologist who reported unremarkable levels of renin and aldosterone, normal renal duplex ultrasonography examination, and a renal biopsy that showed acute tubular injury. Serology results for lupus and scleroderma were also negative. Three weeks prior to presentation, she was admitted to a local hospital for rapidly progressing renal failure with an increase in serum creatinine to 9 mg/dl from a baseline of 0.9 mg/dl, oliguria, and a blood pressure of 210/120 mm Hg. At the time of presentation to the authors' institution, her symptoms included dyspnea, orthopnea, fatigue, myalgias, arthralgias, arm paresthesia, eye floaters, and severe oliguria requiring dialysis for the previous 3 weeks. She was admitted from the nephrology clinic with a blood pressure of 162/86 mm Hg. On physical examination, her abdomen was mildly distended with no

LEARNING OBJECTIVES

- To describe the differential diagnosis for a patient with new onset renovascular hypertension, which includes atherosclerosis, FMD, and rarely, Takayasu's arteritis.
- Takayasu's arteritis is an autoimmune inflammatory vasculitis predominantly in women at an early age of onset (<40 years of age).
- Takayasu's arteritis presents with stenosis or aneurysm of large and medium-sized arteries (aorta and its primary branches) leading to vascular damage, causing hypertension and/or end-organ ischemia, absent or reduced pulses, and asymmetric blood pressure.

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Informed consent was obtained for this case.

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abdominal bruit. She had a bruit over the right subclavian artery and a systolic murmur best heard at the left upper sternal border with normal upper and lower extremity pulses and no carotid bruits. She was admitted for initiation of hemodialysis and management of hypertensive crisis. She underwent further evaluation for secondary causes of her hypertension and renal failure. Magnetic resonance angiography without the use of gadolinium contrast of the abdomen demonstrated mild wall thickening of the abdominal aorta without associated stenosis or aneurysm formation and total occlusion of the bilateral renal arteries

MEDICAL HISTORY

She had no significant medical history prior to the onset of hypertension. There were no fever, chills, night sweats or weight loss. She had previous uncomplicated pregnancies.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis for renal artery stenosis includes atherosclerosis (most common cause in 90% of cases), focal and multifocal fibromuscular dysplasia (FMD), Takayasu's arteritis, giant cell arteritis (GCA), immunoglobulin G4 (IgG4)-related diseases, neurofibromatosis type 1, abdominal aortic coarctation, aortic dissection, and less likely, segmental arterial mediolysis, Bechet disease, polyarteritis nodosa, and radiation (1). Based on her age and sex, as well as presence of signs and symptoms of a systemic processes, such as arthralgias and fatigue, diagnosis focused on evaluation for non-atherosclerotic systemic diseases.

INVESTIGATION

Inflammatory markers as well as autoimmune and immunologic studies revealed an antinuclear antibody result of 1:160 with negative extractable nuclear antigen, elevated serum IgG and C-reactive protein (CRP) concentration of 34 mg/l, and a normal erythrocyte sedimentation rate of 18 mm/h. Complete blood count assay result showed thrombocytopenia and anemia, likely due to renal disease. There was also arterial wall thickening in the common carotid arteries on carotid duplex ultrasonography without tortuosity (**Figure 1A**). Fluorodeoxyglucose (FDG)-labeled positron emission tomography (PET) demonstrated increased FDG activity in both common carotid arteries (**Figure 1B**). Initial renal angiography showed complete occlusion of the bilateral renal arteries and, after an initial balloon angioplasty, showed multiple areas of narrowing and dilation (**Figures 2A and 2B**). Given the imaging findings, immunological results, constitutional symptoms, and age and sex of the patient, her diagnosis was most consistent with Takayasu's arteritis.

ABBREVIATIONS AND ACRONYMS

CRP = C-reactive protein

FMD = fibromuscular dysplasia

GCA = giant cell arteritis

PET = positron emission tomography

NEXT STEPS IN MANAGEMENT

She underwent successful balloon angioplasty of the right renal artery and stent placement of the left renal artery (**Figures 2C and 2D**) resulting in dramatic improvement of renal function and resolution of renal failure. Renal artery revascularization also improved her hypertension as was seen on renal artery duplex ultrasonography (**Figure 1C**). For large vessel vasculitis, she received high-dose (1 mg/kg daily) glucocorticoids for induction as an inpatient and was discharged home with a combination of prednisone and adalimumab for maintenance therapy. Constitutional symptoms improved. Ophthalmology evaluated her for eye floaters and found pigment epithelial detachment and retinal hemorrhages around the bilateral optic nerves. Optical coherence tomography of the eyes showed bilateral macular edema likely due to hypertensive retinopathy (**Figure 1D**).

DISCUSSION

This patient's condition was diagnosed as Takayasu's arteritis with renal artery stenosis as the cause of her uncontrolled hypertension and rapidly deteriorating renal function. The most common causes of renal artery stenosis are atherosclerosis and FMD. Atherosclerosis usually involves the proximal renal arteries and tends to occur in older patients with typical cardiovascular risk factors such as smoking, hyperlipidemia, and coronary or peripheral artery disease (1). This patient's age and absence of risk factors made atherosclerosis a less likely cause. FMD, a noninflammatory and nonatherosclerotic arterial disease, usually involves the mid to distal renal arteries in multifocal FMD and rarely leads to renal failure or total occlusion of the renal artery. Focal FMD can occur in any portion of the artery, but renal artery occlusions are extremely rare and bilateral renal artery occlusions have not been reported (2,3). The presence of inflammatory markers made the diagnosis of a large vessel vasculitis more likely. Both

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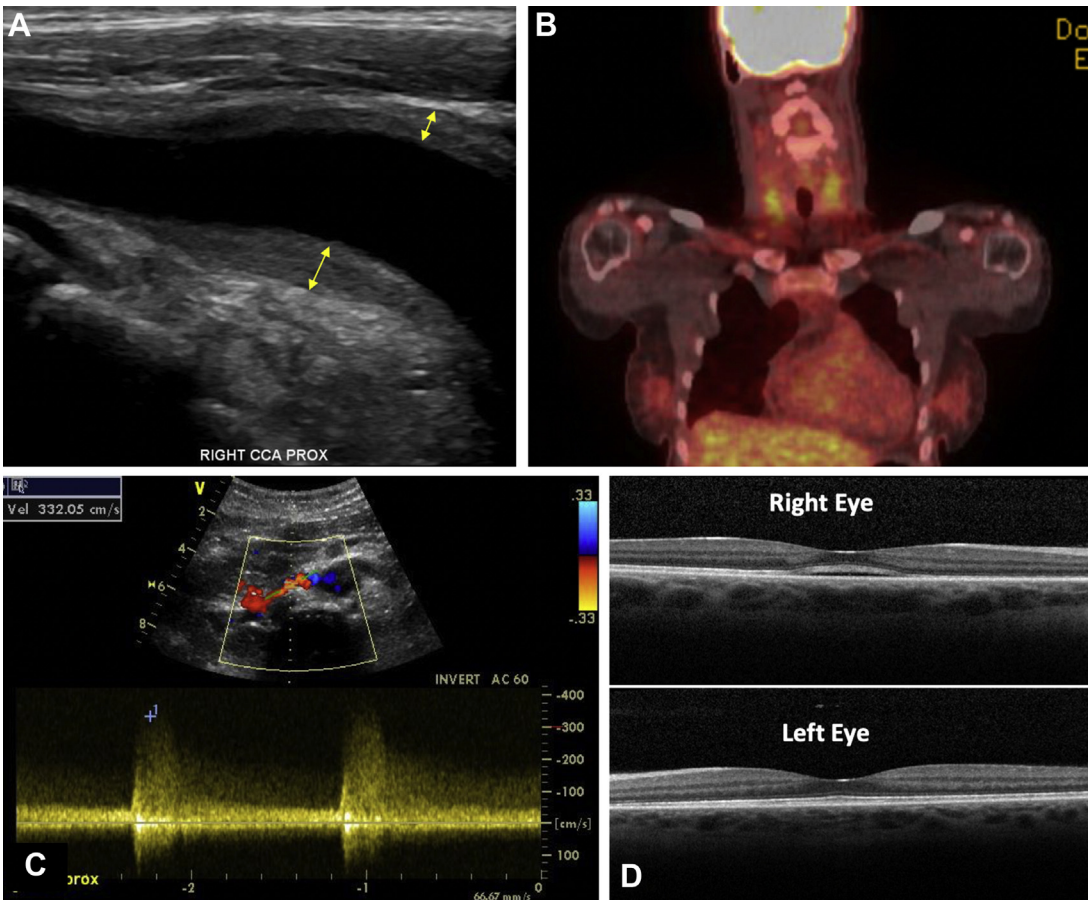
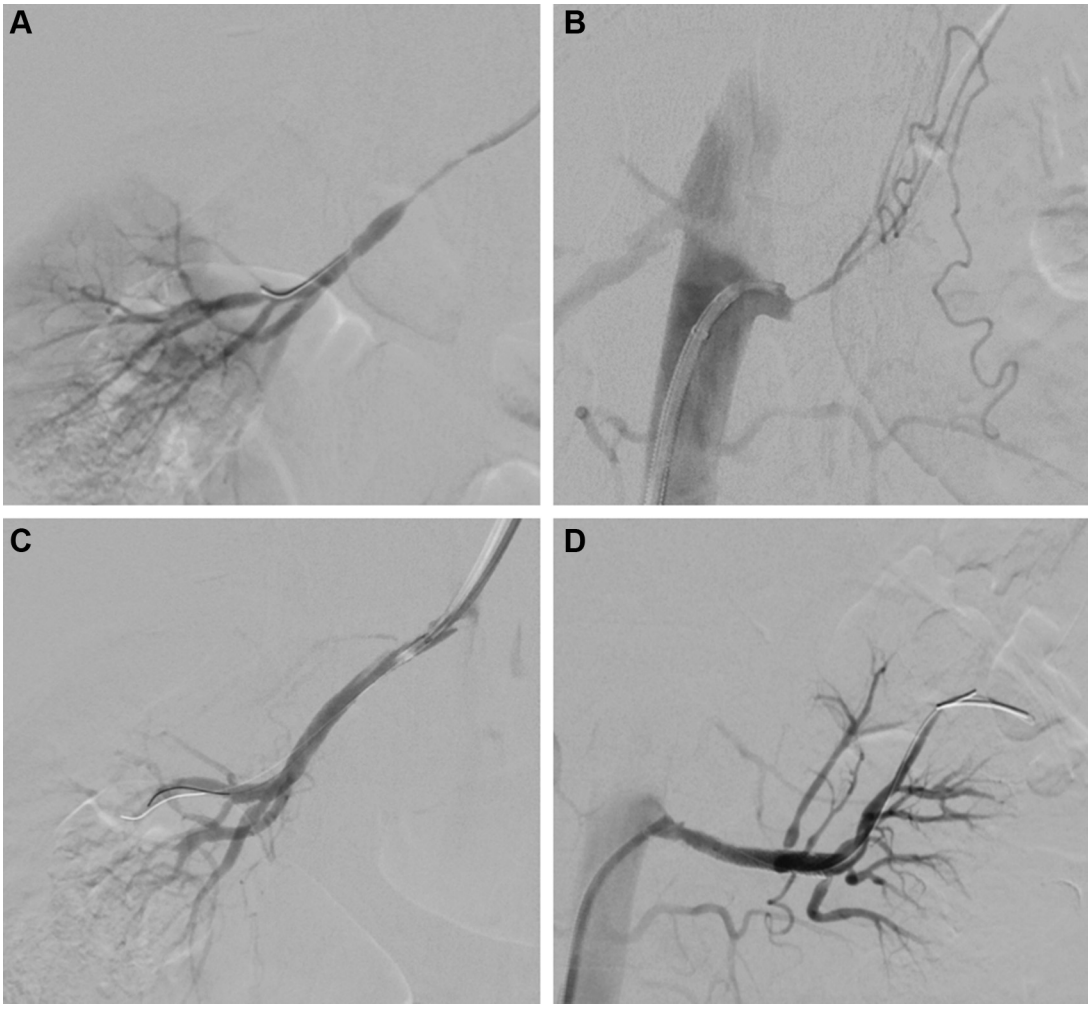
FIGURE 1 Concentric Arterial Wall Thickening



(A) Right carotid artery duplex ultrasonography demonstrating concentric arterial wall thickening **(arrows)**. **(B)** Positron emission tomography/computed tomography scan with increased uptake in the bilateral carotid arteries. **(C)** Follow-up renal artery duplex ultrasonography shows flow in the right renal artery with elevated velocities due to residual stenosis after revascularization. **(D)** Right and left eye optical coherence tomography scans show bilateral macular edema.

Takayasu's arteritis and GCA are large vessel (aorta and its major branches) vasculitides that are characterized by ischemic and systemic manifestations and granulomatous inflammation on histopathology (4). Both of these autoimmune inflammatory vasculitides result in stenosis or aneurysm of radiographically large and medium-sized arteries. Temporal arteritis (one manifestation of GCA) typically presents with symptoms such as headache, jaw claudication, scalp tenderness, and polymyalgia rheumatica (4), which were not present in this patient. Systemic GCA occurs in patients above the age of 50 years and primarily affect the vessels of the aortic arch but may affect any large artery in the body. On the other hand, Takayasu's arteritis usually occurs in women below the age of 40 and, while pathologically identical to GCA, has a different phenotypic presentation. Takayasu's arteritis is rare, with an incidence of 2.6 cases per million per year, and the highest incidence occurs in Asians. It predominantly affects women (80% to 90% of cases) of <40 years of age (median age: 25 years). Patients may initially present with constitutional symptoms (pre-pulseless phase). Takayasu's chronic inflammation leads to vascular damage and stenosis over a period of months resulting in end-organ damage, and therefore patients are

FIGURE 2 **Renal Angiography After Low-Profile Balloon Angioplasty**



(A) Right and **(B)** left renal angiograms after low-profile balloon angioplasty. **(C)** Right renal artery angiogram after angioplasty. A non-flow-limiting dissection is present in the artery. **(D)** Left renal artery angiogram after balloon angioplasty and stent placement.

characterized with absent or reduced pulses and asymmetric blood pressure (5). The American College of Rheumatology classification criteria determines age at disease onset as the most discriminatory variable for classifying patients. The age of onset of <40 years is 1 criterion for Takayasu (6), and ≥50 years is 1 of the criteria for GCA (7). This patient's symptoms of refractory hypertension and subacute renal failure were hallmarks of renal artery stenosis. Although most cases of renal artery stenosis are due to atherosclerosis and FMD (1), this patient's age (<40 years), bilateral renal artery involvement, thickened arterial wall on carotid duplex, and elevated inflammatory markers (CRP, serum IgG) made Takayasu's arteritis the most likely diagnosis.

FOLLOW-UP

At 6 months, her blood pressure was controlled with labetalol. Magnetic resonance angiography and renal artery duplex ultrasonography showed flow with some residual stenosis in the bilateral renal arteries. Serum creatinine concentration was maintained at 0.9 mg/dl. Thrombocytopenia and anemia resolved, and visual symptoms along with retinal optical coherence tomography examination results improved.

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CONCLUSIONS

Although rare, large artery vasculitis such as Takayasu's arteritis should be considered on the differential diagnosis for renal artery stenosis.

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