Rare Case of Takayasu Arteritis with Concurrent Aneurysmal Dilation and Stenosis

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Int J Angiol 2015;24:244–248.

Abstract

Takayasu arteritis is a rare, chronic large vessel vasculitis that primarily affects women aged 10 to 40 years of Asian descent. The inflammatory processes of the disease can result in stenosis and/or occlusion of the aorta and its branches, causing a wide range of symptoms. Rarely, damage of the elastic lamina or muscular media can cause aneurysmal dilation of the affected vessel. Diagnosis is based on the clinical presentation, laboratory proof of inflammation, and imaging finding of wall thickening in the acute phase and later arterial stenosis or occlusion. Management includes disease control with immunosuppression and some patients might require revascularization. Here, we present a rare case of Takayasu arteritis with both right common carotid artery aneurysmal dilation and stenosis at a conforming site. Although aneurysmal dilation has been sparsely reported in the Takayasu arteritis literature, our case may represent the distinct finding of concomitant dilation and stenosis in this disease.

Keywords

- Takayasu arteritis
- vasculitis
- stenosis
- aneurysm

Case Report

A 30-year-old woman from Japan with a history of hypothyroidism and chronic intermittent right side throbbing headache presented with a 3-month history of intermittent right side neck pain that was aggravated with neck movement and associated with mild blurry vision. Vital signs revealed a blood pressure of 106/78 mm Hg in bilateral upper extremities, a heart rate of 72 beats/min, and a normal temperature. Physical examination displayed normal findings aside from a low-pitched bruit in the right side neck. Laboratory findings revealed a normal complete blood count and an unremarkable basic metabolic profile. Magnetic resonance (MR) angiogram of the neck and brain revealed aneurysmal dilation of the right innominate and proximal right common carotid arteries associated with circumferential wall thickening of the right common carotid artery. It also revealed a 75% focal stenosis by NASCET criteria in the right common carotid artery distal to the aneurysmal dilatation (–Fig. 1a, b).

To further explore, MR aortogram with T2-weighted images (VIBE technique) were negative for aortic wall thickening, stenosis, dilatation, or involvement of the visceral vessels. It redemonstrated the aneurysmal dilatation of the right innominate artery with a maximum diameter measuring 2.0 cm as well as aneurysmal dilatation and stenosis of the right common carotid artery.

Further laboratory work up revealed an elevated erythrocyte sedimentation rate (ESR) of 48 mm/h with a normal C-reactive protein (CRP) level of 0.8 mg/dL.

On the basis of her gender, place of origin, age, clinical presentation, laboratory, and imaging findings, the diagnosis of Takayasu arteritis was made. As her symptoms were mild and inflammatory markers were not significantly elevated, management was started with prednisone 20 mg and aspirin 81 mg daily. The patient's symptoms improved over the next month and repeat laboratory work displayed normalized ESR (18 mm/h) and CRP (0.7 mg/dL) levels. Repeat MR aortogram revealed persistent right innominate and right common

published online
April 20, 2015

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Tel: +1(212) 584-4662.

DOI <http://dx.doi.org/10.1055/s-0035-1549363>.
ISSN 1061-1711.

Fig. 1 (a) A three-dimensional time-of-flight images from the magnetic resonance angiogram. A coronal subtracted maximum intensity projection demonstrates a right innominate artery aneurysm (long bottom arrow), right proximal common carotid artery aneurysmal dilation (short middle arrow), and right common carotid artery stenosis more distally (top arrow). (b) An axial image demonstrating severe wall thickening and aneurysmal dilatation in the right proximal common carotid artery (long and short arrows).

carotid artery aneurysms with slight interval improvement in focal stenosis of the right common carotid artery. It also revealed suspected mild stenosis of the right subclavian artery origin (→ Fig. 2).

The patient continues to be totally asymptomatic on 20 mg of prednisone with a plan of slow taper over 6 to 12 months' period.

Discussion

Takayasu arteritis is an uncommonly rare, chronic large vessel vasculitis with poorly understood pathogenesis and etiology.^{1,2} Women are 8.5 times more likely to be affected than men, with a typical onset between 10 and 40 years of age.^{2,3}

Fig. 2 A three-dimensional time-of-flight coronal subtracted maximum intensity projection image from the follow-up magnetic resonance angiogram neck demonstrates persistent right innominate and right common carotid artery (RCCA) aneurysms with slight interval improvement in focal stenosis of the RCCA (long arrow), and suspected mild stenosis of the right subclavian artery origin (short arrow).

Despite a worldwide distribution, the disease is most common in Asian populations; Japan has an estimated 150 new cases per year, compared with 1 to 3 new cases per year per million people in the United States and Europe.^{3,4} The disease primarily affects the aorta and its branches, with initial lesions often occurring in the left mid or proximal subclavian artery.^{5,6} Arterial wall thickening is caused by inflammatory processes and can result in narrowing, occlusion, or rarely dilation in varying degrees, yielding a wide range of symptoms and presentations.⁷ Early systemic features of the disease may include fever, night sweats, weight loss, mild anemia, myalgia, malaise, or arthralgia.⁸ As the disease progresses, other manifestations may include headaches, carotidynia, myocardial ischemia, or erythema nodosum.⁸ Neurological features comprise postural dizziness, seizures, or amaurosis that can be secondary to hypertension or brain ischemia.⁸

Physical examination reveals vascular bruits which are heard in a majority of patients, in addition to diminished or absent pulses accompanying right/left blood pressure discrepancies and limb claudication.² Hypertension is also common and reflects renal artery stenosis, seen in 28 to 75% of patients.^{2,9}

Diagnosis is based on history and presenting symptoms, in conjunction with imaging of the arterial tree.¹⁰ MR, computed tomography (CT), or catheter-based angiography usually shows smooth, tapered narrowing, or occlusion of the lumen accompanied by increased arterial wall thickness.¹⁰ Although catheter-based angiography provides information on vessel lumen anatomy, CT or MR angiography allows clear

visualization of wall thickening, in addition to dilation, stenosis, or aneurysms.^{11,12} This method is preferred to invasive angiography that unnecessarily exposes patients to high-dose radiation and procedure-related risk.¹¹ Laboratory findings such as elevated ESR and CRP levels are mostly nonspecific, but they can reflect the underlying inflammatory process in Takayasu arteritis.^{3,11}

Inflammation accompanies Takayasu arteritis and can lead to damage of the elastic lamina and muscular media, which can rarely cause aneurysmal dilation of the vessel. Scarring has also been shown to progress from the adventitia and compromise the vascular lumen.¹² In addition,

stenotic arterial lesions can be a result of intimal proliferation.¹² A report by Seko et al found that infiltrating cells in the aortic tissue largely comprised of killer cells, particularly gamma delta T lymphocytes.¹³ Another study found anti-endothelial antibody levels nearly 20 times greater than normal in the serum of 18 of 19 patients with Takayasu.¹⁴ Differential diagnoses include atherosclerosis, giant cell arteritis, cerebral vasculitis, Behcet vasculitis, fibromuscular dysplasia, Cogan syndrome, late sequela of Kawasaki disease, and connective tissue disorders such as Marfan syndrome and Ehlers–Danlos syndrome (►Table 1^{3,9–11,15–20}).

Table 1 Differential diagnoses that should be considered when evaluating a patient for Takayasu arteritis with signs/symptoms and differentiating tests^{3,9–11,15–20}

Disease/condition	Differentiating signs/symptoms	Differentiating tests
Giant cell arteritis	Inflammatory medium and large vessel arteritis predominantly affecting external carotid artery in elders. Polymyalgia rheumatica may be concurrent. Jaw claudicating is common. Lower extremity involvement is less common.	Imaging with CT or MRA; GCA is more likely to involve cranial artery than lower extremity circulation.
Cerebral vasculitis	Rare inflammatory medium and small cerebrovascular vasculitis leading to variety of symptoms including headache, difficulty with body part coordination, confusion, changes in sensation or perception and stroke.	Cerebral angiography or MRI of the brain: endothelial thickening leading to stenosis. Brain biopsy.
Behcet disease	A triad of oral and genital ulceration with uveitis. Often accompanied by a peripheral arthritis. May have arterial and/or venous thrombosis.	Angiography: reveals saccular dilation of involved arteries or thrombotic occlusion. CSF examination supportive but not diagnostic; increased inflammatory cells and protein.
Cogan syndrome	Inflammatory medium and large vessel vasculitis with systemic involvement including anterior eye and ear leading to blurred vision, eye redness, pain, and photosensitivity as well as hearing loss and dizziness.	Clinical diagnosis. Slit-lamp examination.
Kawasaki disease	Inflammatory medium vessel vasculitis with high-grade fever, strawberry-tongue, marked lymphadenopathy, red eyes with uveitis or conjunctivitis, rash and peeling of the skin on the palms and soles that typically affects children younger than 5 years.	Clinical diagnosis using set criteria. Angiography reveals saccular dilation of affected arteries. Predominantly affects the coronaries.
Marfan syndrome	Connective tissue disease caused by the misfolding of fibrillin. Typically tall patients with long limbs. May have a family history of Marfan syndrome. Susceptible to lens dislocation.	Clinical diagnosis. Family history. Genetic testing.
Ehlers–Danlos syndrome	Inherited connective tissue disorder causing hypermobile joints or paper-thin skin scars.	Angiography: may reveal saccular dilation of involved arteries. Genetic testing.
Atherosclerosis	Typically patients are elder than 40 years. Risk factors include hyperlipidemia, hypertension, smoking, and diabetes.	Angiography: arterial stenosis. Lesions are usually at the vessel origin and or bifurcations.
Fibromuscular dysplasia	Nonatherosclerotic, noninflammatory vascular disease with abnormal vascular wall growth that is more common in females. Most commonly affects renal and carotid arteries.	Angiography: characteristic beading of affected arteries. Aorta usually not involved.

Abbreviations: CT, computed tomographic; CSF, cerebrospinal fluid; GCA, giant cell arteritis; MRA, magnetic resonance angiogram; MRI, magnetic resonance imaging.

Treatment is aimed at suppressing the systemic inflammation and controlling related symptoms. Glucocorticoids have been shown to be mostly effective in halting inflammation and reversing elevation of acute phase reactants.⁹ In patients with glucocorticoid-resistant active disease, methotrexate and/or azathioprine may be considered.²¹ There is new evidence indicating that rituximab, a B cell targeting medication might be helpful in patients with refractory Takayasu arteritis.^{1,22}

Our patient's diagnosis of Takayasu arteritis was based on the presentation of indicative clinical symptoms, along with CT and MR angiography revealing stenosis, wall thickening, and ultimately dilation of parts of the aortic branch. Successful resolution of symptoms and normalization of ESR levels on prednisone validated the presence of inflammation accompanying this disease. Although Takayasu arteritis is rare, the presentation of the disease with associated aneurysmal dilation of arch vessels is exceedingly rare.²³ Furthermore, the presentation of the disease with concomitant aneurysmal dilation and stenosis or occlusion is even less common.^{24,25} In a review of 106 patients with Takayasu arteritis over 50 years, only 6 patients were found to have accompanying carotid aneurysms.²⁶ Of these six patients, three had associated arterial occlusions: one with occlusion of the left radial artery, one with occlusion of the celiac artery and stenosis of the abdominal aorta, and one with coarctation of the aorta. Only two patients displayed concomitant wall thickening along with aneurysmal dilation.²⁶ Interestingly, in all these six cases, the stenoses or wall thickening was found in areas discrete from the aneurysmal lesions. Only two cases have been reported of aneurysmal dilation and stenosis at a conforming site.^{24,25}

Some authors believe that blood pressure, rather than disease location seems more closely linked to dilation and appears to be the major risk factor for Takayasu arteritis morbidity.^{27,28} In our case, we believe the aneurysmal dilation was a result of vascular wall inflammation and thickening, as the patient did not demonstrate elevated blood pressure. Death in Takayasu arteritis is most commonly caused by a cerebrovascular event or congestive heart failure.⁹ In rare cases, aneurysmal lesions can rupture or dissect, necessitating the need for urgent surgical intervention.^{29,30} One must carefully weigh the decision to operate on patients with Takayasu arteritis because of the inherent inflammatory properties of the disease, with complications such as hemorrhage, valve and suture line detachment, pseudoaneurysm formation, and paravalvular leakage.³⁰ We did not consider any surgical or endovascular intervention for our patient as she is completely asymptomatic.

Conclusion

Takayasu arteritis with associated aneurysmal dilation of the arch vessels has been sparsely reported in the literature.^{23,26,27,30} Occlusion or stenosis accompanying this dilation has been an even more seldom condition.²⁴⁻²⁶ Some patients may also have simultaneous wall thickening.^{25,27} Our article represents a unique case among scarce reports

in the Takayasu literature, with aneurysmal dilation and stenosis occurring in the same arch vessel caused by wall thickening. Only two other Takayasu cases we found in the literature described the dilation and stenosis/occlusion at an analogous site. We recommend taking Takayasu arteritis in consideration when evaluating patients with aortic branch stenosis and or dilation.

Funding

No financial support was needed or provided by any source.

Note

This article is original and is not under consideration by another journal, and has not been previously published.

Acknowledgment

We acknowledge Alexander Rodriguez for his hard work in preparing this article.

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