Takayasu Arteritis Diagnosed with Magnetic Resonance Imaging — A Case Report

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Takayasu arteritis is an inflammatory process of the aorta and its major branches. It often occurs in young Asian females. Clinical manifestation and conventional arteriography are the bases of diagnosis. In early phase, inflammation involves all layers of vessels and periartorial tissue to cause aortic wall thickening. Conventional arteriography may not show these mural changes in the great vessels. In late occlusive phase, both the conventional arteriography and magnetic resonance (MR) imaging may show luminal changes such as stenosis, occlusion, aneurysm, collateral branches and dilatation of aorta or pulmonary artery. MR imaging and MR angiography have been used to replace conventional arteriogram for diagnosis and follow-up after treatment due to their non-invasive nature and absence of radiation exposure. Furthermore, MR imaging can detect abnormality in vessel wall in early phase of the disease. In Taiwan, reports on the diagnosis of Takayasu arteritis based on MR imaging and MR angiography are rare. We report a 44-year-old female diagnosed as late occlusive phase of Takayasu arteritis according to American College of Rheumatology diagnostic criteria and magnetic resonance imaging.

Key Words: Takayasu arteritis • Magnetic resonance imaging • Magnetic resonance angiography

INTRODUCTION

Takayasu arteritis, known as pulseless disease or Martorell syndrome, is a chronic inflammatory arteriopathy preferentially involving the aorta and its major branches, such as carotid, brachiocephalic, vertebral, subclavian and renal arteries. Coronary and pulmonary arteries can also be affected.1 Histologically, Takayasu arteritis is characterized by panarteritis. It could be divided into early inflammatory phase and late fibrotic phase. In acute phase, diffuse inflammation in the media and adventitia by lymphocytes can be seen. The intima becomes thickened by infiltration of fibroblasts, smooth muscle cells and mucopolysaccharides. In late fibrotic phase, there are thinning of the media, destruction of elastic tissue and thickening of the adventitia and intima.1,2 Takayasu arteritis is common in certain Asian countries, including Japan, China, Korea, India, Thailand and South Central America, but very rare in Caucasians.3 Its clinical picture includes pulselessness, dizziness, fatigue, headache, seizure, claudication, visual disturbance, vascular pain and hypertension. Pleurisy, fever, night sweats, cough and arthralgia, are also common in early phase.4 Elevation of erythrocyte sedimentation rate, anemia and hypergammaglobulinemia are the important laboratory features. Conventional catheterization angiography can be used to detect late luminal changes of Takayasu arteritis, however, MR imaging has been increasingly utilized as a noninvasive imaging modality for diagnosis of early and chronic lesions of Takayasu arteritis and follow-up after treatment.5 Herein, we report a case of Takayasu arteritis diagnosed with MR imaging.
CASE REPORT

A 44-year-old female presented to our outpatient department with mild chest tightness off and on for more than 10 years. In the recent 5 years, she had developed intermittent claudication and easy fatigue in doing housework. In addition, transient blurred vision with headache bothered her in the past three months. She had received Cesarean section once more than 10 years previously and was diagnosed as dry eye syndrome four years before. There was no history of hypertension, diabetes mellitus, dyslipidemia or smoking. There was no family history of coronary artery disease. The patient was 145 cm tall and weighed 58 kg. Initial physical examination revealed decreased pulsation in the right brachial artery and impalpable pulse in left brachial and left radial arteries. The blood pressure measured in her right forearm was 110/70 mmHg. A grade II/IV systolic murmur could be heard over her left upper sternal border. She was admitted under the tentative diagnosis of left subclavian artery steal syndrome. During hospitalization, decreased pulsations of bilateral popliteal arteries and absence of bilateral dorsal pedis arteries were found. Bruits were detected over the left carotid artery, left subclavian artery and abdominal area. Vascular ultrasound revealed abnormal Doppler signal in the left subclavian artery with reversed flow direction of the left vertebral artery, suggested significant stenosis in the left subclavian artery. Flow velocity in bilateral femoral arteries were reduced, suggesting significant stenosis between the abdominal aorta and bilateral common iliac arteries. Electrocardiogram disclosed normal sinus rhythm. Exercise electrocardiogram was probably negative, at eighty one percent of maximal predicted heart rate. Dipyridamole stress-redistribution Thallium-201 SPECT myocardium perfusion imaging was normal. Echocardiogram showed normal chamber size and good left ventricular function without any regional wall motion abnormalities. Laboratory data revealed normal ESR (6 mm/hour, 14 mm/2 hour), normal renal function (BUN 12 mg/dL, Cr 0.7 mg/dL), normal hemoglobin and white blood count (Hb 12.7 g/dL and WBC 8450/cmm, respectively). Immunoprofile including rheumatoid agglutinin, antinuclear antibody and anti-cardiolipin antibody were all within normal limits. A series of examinations indicated stenosis of major branches of the aorta and highly suggested Takayasu arteritis. To avoid the possible complications of conventional arteriography which might further compromise the perfusion to her lower extremities, we decided to arrange MR imaging first. The MR imaging was performed on a 1.5 Tesla imager (Philips Gyroscan ACS-NT, Eindhoven, Netherlands). The MR imaging sequences used an echo time of 1.8-3.8 msec, a repetition time of 33-170 msec, field of view of 380 × 380 to 420 × 420 mm and an acquisition time of 0.8-2.2 sec. In addition, 3-D contrast-enhanced MR angiography was performed using an echo time of 1.3-1.4 msec, a repetition time of 5.1-5.4 msec, field of view of 380 × 380 to 460 × 460 mm and acquisition time of 0.8-1.2 sec. The scanning was performed after intravenous injection of gadopentetate dimeglumine (Magnevist, Schering, Berlin, Germany). A total of 11.6 mL of gadopentetate dimeglumine was injected at a rate of 2.5 mL/sec. It revealed discrete stenosis of the proximal left common carotid artery, total occlusion of the left subclavian artery at ostium, nearly total occlusion of the right subclavian artery at carotid orifice level and minimal opacification of the right axillary artery from collateral vessels from the external carotid artery and chest wall (Figure 1). It also showed diffuse long segmental aortic wall irregular thickening from the thoracic aorta to upper abdominal aorta with multiple stenosis and total occlusion of abdominal aorta at infrarenal level, with collateral vessels from left renal artery bridging to distal

Figure 1. Discrete stenosis of the proximal left common carotid artery (arrow), total occlusion of left subclavian artery at ostium, nearly total occlusion of right subclavian artery at carotid orifice level (arrowheads) and diffuse long segmental aortic wall irregular thickening from thoracic aorta to upper abdominal aorta with multiple stenosis.
abdominal aorta. Diffuse narrowing of bilateral common iliac arteries with collateral branches from abdominal wall vessels to supply bilateral common femoral arteries was also found (Figure 2). After exclusion of other possible etiologies of vasculitis, the diagnosis of Takayasu arteritis was made. Corticosteroid therapy and surgical intervention was suggested to the patient. But the patient preferred conservative treatment than invasive treatment. During a follow-up period of six months, there was no marked progression of limb ischemia or coronary ischemia.

DISCUSSION

The diagnosis of Takayasu arteritis depends on the classic clinical findings and is supported by typical arteriography. American College of Rheumatology (ACR) defined the diagnostic criteria in 1990. Conventional arteriography typically shows lumen stenosis, poststenotic dilatation, aneurysm formation, irregularity of vessel walls and occlusion with collateral branches; these features are found in the chronic and recurrent phase.

In early phase of Takayasu arteritis, inflammation involves all layers of vessels and periaortic tissues to cause aortic wall thickening. Conventional arteriography may not show these mural changes in the great vessels. MRI has the advantages of good contrast resolution of direct imaging in the axial, sagittal and coronal planes. The spin-echo technique can distinguish the arterial lumen from its wall without using contrast medium. During the late occlusive and recurrent phases, the conventional arteriography may show luminal changes such as irregularity, stenosis, occlusion, aneurysm formation, collateral branches and dilatation of aorta or pulmonary artery. Moriwaki et al. defined a new classification of Takayasu arteritis in 1997 according to the angiographic findings. This system is useful in comparison of vessels involvement for surgical decision.

Recently, MR imaging and MR angiography have been widely accepted for diagnosis and follow-up of aortic disease. They can provide a fast overview of the aorta and pulmonary artery anatomy to depict intraluminal changes for determining the extent and severity of arteritis in late occlusive phase. In early phase, MR imaging provides good contrast resolution of vessel wall inflammation. However, they are effective in detecting proximal and large vessel lesions, not in distal lesions. Maybe, this will be overcome in the near future. Compared with MRI, conventional arteriography is rather invasive and has a higher risk of thromboembolic event due to vessel wall injury. In particular, the freedom of exposure to radiation makes MRI a better choice in the diagnosis and long term follow-up of Takayasu arteritis.

REFERENCES