Takayasu arteritis diagnosed by 16-row multidetector CT angiography

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ABSTRACT

Takayasu's arteritis is a well-known systemic disease that involves the aorta, major aortic branches, and pulmonary arteries. Conventional catheter angiography remains the 'gold standard' for disease diagnosis, in correlation with clinical data and laboratory findings. Multislice computed tomography angiography (MSCTA) has the advantage of non-invasively providing the angiographic data and combining morphological mural assessment with luminal evaluation. We present 2 such cases diagnosed by 16-slice MSCTA.

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Case Reports

Takayasu arteritis diagnosed by 16-row multidetector CT angiography. However, being an invasive procedure, it has its inherent limitations. Moreover, the findings are unreliable during the early inflammatory phase, as it does not provide information on mural inflammation or thickening. Multislice computed tomography angiography (MSCTA) has emerged as a promising non-invasive approach to vascular diseases by allowing simultaneous evaluation of luminal and vessel wall changes. We highlight the role of 16-slice MSCTA in the assessment of aortic diseases such as Takayasu's arteritis, and we assert that MSCTA is on its way in replacing catheter angiography as the new 'gold standard' in aortic imaging.

Case Report. Patient 1. A 21-year old female patient presented to the outpatients' department of Medicine with a complaint of headache for 12-14 months. She also complained of a vague abdominal pain for 8 months. There was no history of fever or exertional dyspnea. On physical and clinical examination, the patient was thinly built and hypertensive. A systolic bruit was auscultated in the left lumbar region and lower abdomen. There was a discrepancy in blood pressure measured in the upper extremities and the lower extremities. No cardiac murmur was auscultated. No bruit was heard over the subclavian and carotid arteries. Both brachial pulses were normal. No abdominal mass was palpated. The hematological examination revealed erythrocyte sedimentation rate of 125 mm in the first hour and elevated C-reactive protein levels. Tuberculin test result was negative. Immunologic markers such as antinuclear antibody and antineutrophil cytoplasmic antibodies were negative.

Patient 2. A 33-year old female patient presented to the outpatients' department of Vascular Surgery with complaints of intermittent claudication and malaise for 10-12 months. She also complained of intermittent headache for 12-14 months and intermittent nausea and vomiting for 10 months. A history of weight loss for 8 months was also present. There was no history of fever, dizziness or exertional dyspnea. On physical and clinical examination, the patient was thin built and hypertensive. A systolic bruit was auscultated in the left lumbar region and lower abdomen. There was a discrepancy in blood pressure measured in the upper extremities and the lower extremities. No cardiac murmur was auscultated. No bruit was heard over the subclavian and carotid arteries. The brachial pulses were normal. No abdominal mass was palpated. The hematological examination revealed erythrocyte sedimentation rate of 125 mm in the first hour and elevated C-reactive protein levels. Tuberculin test result was negative. Immunologic markers such as antinuclear antibody and antineutrophil cytoplasmic antibodies were negative.
were normal. The hematological examination revealed erythrocyte sedimentation rate of 147 mm in the first hour and elevated C-reactive protein levels. Tuberculin test result was negative. Immunologic markers such as antinuclear antibody and antineutrophil cytoplasmic antibodies were negative.

The x-rays of the chest and abdomen for both the patients were normal. Ultrasound examination showed localized aortic narrowing in the mid-abdomen in both the patients. The abdominal solid viscera were normal. An MSCTA was performed in both the patients to assess the status of the entire thoraco-abdominal aorta and its major branches. A 16-row multidetector CT scan machine was used with slice thickness 1.25 mm, pitch 0.75 with rotation time 0.6 seconds. The scan was performed in the cranio-caudal direction starting from the level of the root of neck until the level of mid-thigh. A 120 cc bolus of non-iodinated contrast (Inj. Iohexol 350 mgI/mL) was injected at a flow-rate of 6 mL/sec, followed by saline chase and the scan was started using the ‘smart prep’ software. Submillimeter axial sections were reconstructed with 50% overlap for post-processing techniques. Multiplanar reconstructions in sagittal and coronal planes were performed. Three-dimensional images were reconstructed by maximum intensity projection and volume rendering techniques. The abnormality of the aorta and its major branches seen on the three-dimensional images was correlated with the axial and multiplanar images. The MSCTA demonstrated concentric mural thickening of the abdominal aorta inferior to the origin of the superior mesenteric artery in both the patients. Left renal artery stenosis was also seen in the first patient (Figures 1a & 1b). Kinking of the aorta was seen in the second patient (Figures 2a & 2b). Smooth luminal narrowing was seen in the involved aortic segment (Figure 1a). Both pulmonary arteries as well as the aortic arch were uninvolved.

**Discussion.** Takayasu’s arteritis or nonspecific aortoarteritis is a panarteritis of unknown etiology that primarily involves vessel walls. It usually affects young women, and its prevalence in females is approximately 10 times higher than in males. It is more common in the orient. However, it has no racial or geographical predilection. Takayasu’s arteritis is an inflammatory process mainly affecting the thoraco-abdominal aorta with its branches and the pulmonary arteries. According to the diagnostic criteria established by the American College of Rheumatology (ACR), radiology is directly involved in the diagnosis of the disease, demonstrating the typical angiographic abnormalities. Recently, noninvasive methods such as MSCTA, magnetic resonance angiography (MRA) and positron emission tomography (PET) scanning have been investigated for their ability to clinch diagnosis and monitor disease activity in large vessel vasculitis.1 Computerized tomography angiography has the advantage of combining morphological mural vessel assessment with luminal abnormality evaluation.2 The MSCTA can be combined with two-dimensional multiplanar reformations and maximum intensity projection reconstructions in evaluating the occlusive lesions. Furthermore, axial images demonstrate circumferential wall thickening of the aorta and its involved branches. Three-dimensional volume rendered images clearly demonstrate the extent of aortic stenosis and the status of the distal vessels and

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**Figure 1** - Volume rendered a) and sagittal reconstructed b) CT images show concentric aortic mural thickening with aortic stenosis. The mural thickening extends to also involve the left renal artery (arrows).

**Figure 2** - Volume rendered a) and maximum intensity projection b) images show localized aortic stenosis and kinking (thick arrow) with multiple visceral collaterals. The left renal artery also shows mild ostial stenosis (thin arrow).
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We suggest that all the patients suspected of aortic stenosis should be subjected to 16-slice MSCTA for detection of the level and severity of aortic stenosis as well as mural wall thickening, as the standard diagnostic work-up protocol to establish the diagnosis of Takayasu's arteritis.

References


