Takayasu's arteritis involving the pulmonary arteries: evaluation by quantitative dual-energy computed tomographic pulmonary angiography

Long Jiang Zhang* and Guang Ming Lu

Department of Medical Imaging, Jinling Hospital, Clinical School of Medical College, Nanjing University, 305 Zhongshan East Road, Xuanwu District, Nanjing, Jiangsu Province 210002, China

* Corresponding author. Tel/Fax: +86 22 80860185, Email: kevinzhangleongjiang@yahoo.com.cn

A 41-year-old man was transferred to our hospital because of sudden hemiparalysis of his right limbs for 4 days. Physical exam showed paralysis of his right limbs, muscle power of grade 0, and sensation loss. He had undergone a negative head computed tomographic (CT) exam at an outside hospital. However, magnetic resonance (MR) imaging and MR angiography showed acute cerebral infarct in his left frontoparietal lobe resulting from occlusion of the left middle cerebral artery. Digital subtraction angiography displayed severe bilateral stenosis or occlusion of the common carotid and vertebral arteries and collateral vessels between the left vertebral artery and the left internal carotid artery. Anti-SM and anti-U1nRNP were positive. The IgA level was elevated (4.430 g/L). Takayasu’s arteritis was diagnosed. The patient complained of chest distress, breathlessness, and decreasing activity tolerance for the last 5–6 years. Computed tomographic pulmonary angiography (CTPA) (Somatom Definition, Siemens, Forchheim, Germany) in a dual-energy mode was performed, which showed occlusion of the right upper lobe pulmonary artery, severe stenosis of the right main pulmonary and right lower lobe pulmonary arteries, thickened vascular wall (Panels A–C), and moderate stenosis of the left lower lobe pulmonary artery. Dual-energy CT lung iodine maps (Panels D–F) showed multiple perfusion defects in the right upper and middle lung lobes and decreased perfusion in the lower lobe compared with the left lung. Quantitative dual-energy CT measurements of both lungs showed an attenuation value of 23 HU for the right lung and 62 HU for the left lung. Takayasu’s arteritis involving the pulmonary arteries was diagnosed. The patient’s condition improved after high-dose steroid treatment and internal carotid artery stenting. He was transferred to a rehabilitation hospital for further treatment.

Various techniques have been reported to derive functional information on lung perfusion from CT data. The introduction of recent CT scanner generations enables dual-energy CT applications in routine practice. Dual-energy CTPA can simultaneously provide lung perfusion and pulmonary vessel mapping, affording more options for comprehensive lung imaging, and ordinarily does not expose patients to any significant additional radiation over that of standard CTPA techniques. Most previous studies focused on the evaluation of pulmonary thrombo-embolism; to our knowledge, no reports have been available on Takayasu’s arteritis involving the pulmonary arteries. Our report indicates that functional CT-based lung imaging has potential as a one-stop-shop modality for the evaluation of the functional and morphological aspects of pulmonary arteritis.

Panels A and B. (A) Pre-contrast and (B) contrast-enhanced computed tomographic images show severe stenosis of the right lower lobe pulmonary artery as a bright spot (arrow) and thickened vascular wall. Note mild enhancement of the thickened vascular wall.

Panel C. Computed tomographic pulmonary angiography displayed as oblique volume rendering reconstruction shows occlusion of the right upper lobe pulmonary artery and stenosis of the right main pulmonary artery (solid arrow) as well as of the right lower lobe pulmonary artery (open arrow).

Panels D–F. Axial, coronal, and sagittal iodine maps derived from dual-energy computed tomographic pulmonary angiography show multiple perfusion defects in the right upper and middle lung lobes and decreased perfusion in the lower lobe compared with the left lung.