

Multiple simultaneous venous and arterial thromboses in a patient with factor V Leiden disorder: Detection by multislice computed tomography

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Abstract: Arterial thrombosis is extremely rare in patients with factor V Leiden (FVL) mutation. Recent advances in multislice computed tomography (MSCT) technology facilitated diagnosis of thromboembolic events accurately without delay. We report a patient with FVL mutation and acute bilateral lower extremity deep venous thromboses, pulmonary thromboembolism, and acute left anterior descending artery thrombosis, all diagnosed by MSCT. MSCT has been utilized for prompt diagnosis of the concomitant thrombotic pathologies simultaneously.

Keywords: factor V Leiden mutation, arterial, venous, coronary, thrombosis, multislice CT

Introduction

Factor V Leiden (FVL) disorder typically presents as venous thrombosis with or without pulmonary embolism. Although an association between FVL mutation and venous thrombosis is clearly demonstrated, the relationship with arterial thrombosis is still controversial [1, 2]. Herein, we report a 47-year-old male patient with heterozygous FVL mutation presenting with bilateral DVT, acute pulmonary embolism, and coronary syndrome. Using multidetector computerized tomography (MDCT) thromboses of coronary, pulmonary arteries and popliteal veins could be diagnosed at the same time with a single imaging modality.

Case Report

A 47-year-old male patient presented with severe dyspnea for the previous 2–3 days. The patient had a family history of premature coronary artery disease,

50 pack-year smoking and low high-density lipoprotein (HDL) cholesterol of 30 mg/dL. On admission, his blood pressure was 135/80 mmHg, pulse rate was 120 per minute, and respiratory rate was 26 per minute. Physical examination revealed tachycardia and diminished lung sounds on the basal zone of the right lung. Chest X-ray documented right-sided pleural effusion. Electrocardiography demonstrated symmetrical negative precordial T waves (VI–V4). Laboratory studies revealed an abnormal resistance to activated protein C and a heterozygous state for factor V Leiden mutation. Homocysteine levels were above normal limit at presentation.

MDCT data were acquired with a SOMATOM Sensation 16 MDCT scanner (Siemens Medical Systems, Forchheim, Germany). All images were acquired with 16 × 0.75 mm slice collimation, a gantry rotation time of 420 ms, table feed of 2.8 mm per rotation, tube voltage 140 kV, and an effective tube current of 400 mAs. A bolus of 120 mL nonionic contrast agent (Iomeron 400 mgI/mL, Bracco Imaging SpA, Milan, Italy) was



Fig. 1. MDCT showing thromboembolism in a segmental branch of the right pulmonary artery (arrow)

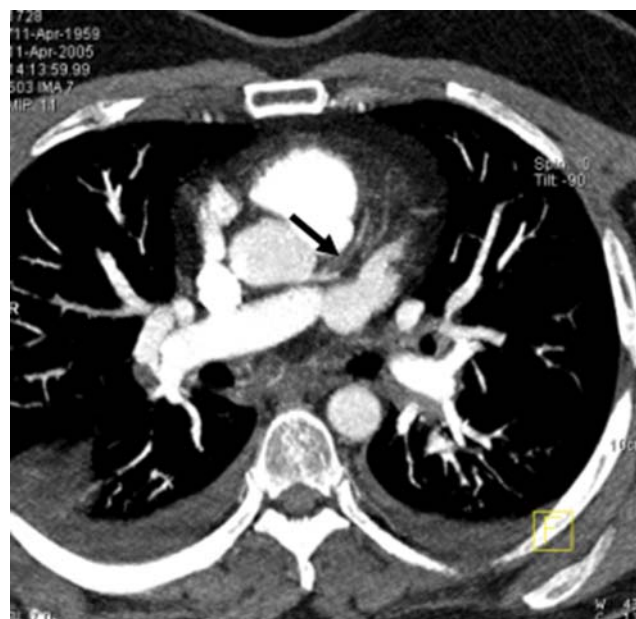


Fig. 2. Thin-slice maximum intensity projection (5 mm) MDCT demonstrates thrombotic occlusion of the LAD (arrow)

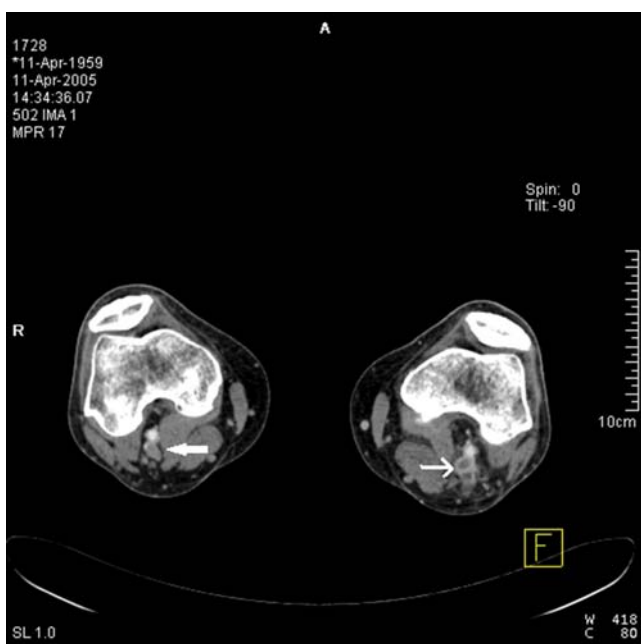


Fig. 3. MDCT showing bilateral popliteal vein thrombosis (arrows)



Fig. 4. Conventional coronary angiography of the patient revealed occluded left anterior descending coronary artery (black arrow) and patent left circumflex coronary artery (white arrow)

intravenously injected at a rate of 4 mL/s. Overlapping transaxial images were reconstructed with a medium sharp convolution kernel (B35f) with an image matrix of 512×512 pixels, slice thickness of 1 mm, and an increment of 0.5 mm with an electrocardiogram (ECG)-gated half-scan algorithm, with a resulting temporal resolution of 210 ms at the center of rotation. Standard three image data sets were reconstructed at 50%, 60%, and 70%

of the R-R cycle. The acquired MDCT data sets were transferred to an offline image analysis workstation. Besides the axial slices, multiplanar reformatted reconstructions (MPR) and thin-slice (5 mm) maximum-intensity projections were used to evaluate the data.

MDCT study revealed bilateral thrombi in the segmental branches of the pulmonary arteries and severe thrombotic narrowing of the left anterior descending

artery (LAD) (Figs 1 and 2). Anteroseptal wall of the left ventricle showed ischemic changes. Late venous phase of the study evaluating the lower extremity deep venous system demonstrated bilateral popliteal venous thrombosis (Fig. 3). Other laboratory parameters confirmed acute coronary syndrome and acute pulmonary embolism. The patient was treated for pulmonary embolism and acute coronary syndrome. Later, a severe thrombotic LAD lesion was confirmed by conventional coronary angiography and a stent was implanted to this lesion (Fig. 4).

Discussion

Factor V Leiden disorder, caused by a point mutation of circulating plasma factor V, is the most common form of familial thrombosis. The clinical syndrome was first described in 1993 as the activated protein C resistance (APC-R) [3]. Activated protein C resistance is seen in 21–33% of patients with deep venous thrombosis and in more than 50% of patients with unexplained thrombosis [4].

Even though studies that investigated the relationship between acute myocardial infarction and factor V Leiden mutation have led to contradictory results [1, 2, 5], evidence suggests that, in young patients (<55 years) presenting with acute myocardial infarction and no evidence of significant stenosis in coronary angiograms, the prevalence of FVL significantly increases [6].

Preliminary reports of CT coronary angiography indicate that CT has reasonable sensitivity and specificity values with increasing accuracy in proximal arteries than distal parts, compared to gold standard, conventional angiography. CT angiography (CTA) appears to be quite useful in evaluating the patency of by-pass grafts and for depicting congenital variants of coronary artery anatomy [7, 8]. One significant advantage of CTA over conventional angiography is the ability to depict fatty composition which is more associated with sudden cardiac death than calcified plaque [9].

Multidetector computed tomography (MDCT) is able to differentiate recent and chronic infarctions. Areas of infarcted myocardium can be identified with moderate to high sensitivity by standard MDCT coronary angiography without additional contrast administration. Localization of infarction can also be assessed accurately compared to cineventriculography [10].

MDCT has a central role in the evaluation of pulmonary artery diseases. MDCT has become the primary diagnostic modality of acute and chronic thromboembolic disease. MDCT allows rapid and useful information in venous thromboembolic disease regarding the source of embolism, degree of pulmonary involvement, and the hemodynamic impact on the right heart in a single examination [11].

Recent improvements in MDCT technology confer the highest diagnostic accuracy in diagnosis of venous thromboembolism with respect to other imaging modalities such as scintigraphy, angiography, magnetic resonance imaging, and Doppler ultrasonography [12]. Recently, Hadizadeh et al. [13] evaluated the potential role of magnetic resonance angiography (MRA) with blood pool contrast agent for simultaneous assessment of arteries and veins and demonstrated that MRA can detect concomitant venous disease affecting therapeutic management.

It is very interesting and rare to see thromboses simultaneously at four different places. Since respiratory and cardiac symptoms closely overlap, a distinction between these pathologies is not always possible. Our patient had dyspnea which could be related to either cardiac or respiratory etiology without symptoms of deep venous thrombosis. However, MDCT promptly revealed all four pathologies. As prompt diagnosis and immediate treatment of venous thromboembolism and acute coronary syndrome are imperative, a single modality for differentiating or diagnosing both pathologies seems very attractive in certain clinical situations, as in our patient.

Study limitations

Even though the society of cardiovascular CT recommends use of a 64-slice or higher CT as an alternative to conventional coronary angiography for the investigation of suspected coronary artery disease [14], we depicted thrombotic coronary lesion using 16 slice MDCT in our study. However, the clinical condition, pertinent laboratory data, and MDCT results underlie the validity of this life-threatening coincidence of arterial-venous thrombotic manifestations.

Conclusion

This case report suggests that in patients with known thromboembolic disorder and suspicion of pulmonary thromboembolism, MDCT may provide simultaneous evaluation of the heart for ischemic heart disease. MDCT may be considered for patients at high risk for thromboembolism and coronary artery disease and to establish pathologies accurately and rapidly.

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