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CASE REPORT

Multiple intrathoracic thrombosis detected on ct scan in patient with antiphospholipid antibody syndrome: case report

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ABSTRACT

Antiphospholipid antibody syndrome (APS) is the clinical correlation between antiphospholipid antibodies and hypercoagulability syndrome. The prevalence of APS in the general population is undetermined. APS disease carries a notable risk of vascular thrombosis. CT scan is the preferred imaging method for assessing thrombosis, although the timing of image acquisition should be considered. The case report detailed the discovery of many intrathoracic thrombosis on a CT scan of a patient diagnosed with the uncommon condition APS. Case study: A 34-year-old woman was hospitalized due to dyspnea, cough, and a 3 kg weight loss over a three-months period. She had a background in deep vein thrombosis (DVT). The test results showed abnormalities in protein C, protein S, and high D-dimer levels. The CT scan revealed numerous intrathoracic thrombi. Antiphospholipid syndrome (APS) is an immunological condition that elevates the likelihood of blood clot formation, resulting in thrombosis inside the arteries and veins. The approximate occurrence rate of APS is five occurrences per 100,000 individuals annually. Antiphospholipid syndrome (APS) leads to the formation of blood clots in the legs, a condition referred to as deep vein thrombosis (DVT). This patient had a history of deep vein thrombosis (DVT) and many blood clots within the chest cavity. A CT scan revealed persistent blood clots in the main pulmonary artery and the right and left pulmonary arteries. Antiphospholipid syndrome (APS) can lead to the formation of blood clots in both arteries and veins. CT scan is the preferred method for evaluating thrombosis, and numerous phases are required to examine all blood arteries.

1. Introduction

Antiphospholipid antibody syndrome (APS) is a systemic autoimmune illness known for causing blood clots in veins and arteries. APS refers to the clinical association between antiphospholipid antibodies and hypercoagulability syndrome (Gomez-Puerta & Cervera, 2014). The exact occurrence of APS in the general population is yet unknown. The estimated incidence rate of APS is 5 per 100,000 persons per year. APS is the leading cause of acquired thrombophilia, deep vein thrombosis (DVT), cerebrovascular disease, and recurrent miscarriages (Da Silva *et al.,* 2014; Dabit *et al.,* 2021; Matyja-Bednarczyk *et al.,* 2014). The clinical manifestations of APS are caused by thrombus in the arteries and veins. Thrombosis can occur in all organs, appearing in blood vessels of various sizes and giving rise to varied clinical manifestations. Clinical manifestations of intrathoracic APS include venous thromboembolism and pulmonary hypertension (Gomez-Puerta & Cervera, 2014).

Vascular ultrasonography with compression

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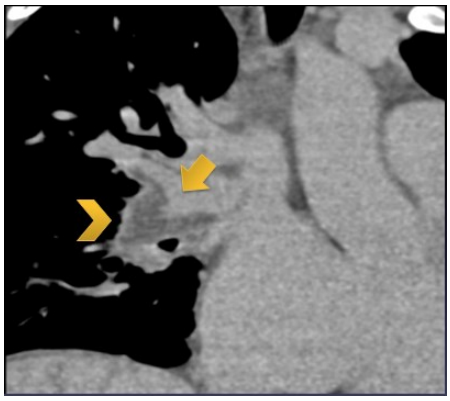

Figure 1. A CT scan of the chest with contrast shows posteroinferior stenosis of the right pulmonary artery branch (arrow) with chronic thrombus in the posteroinferior branch of the right pulmonary artery (arrowhead).

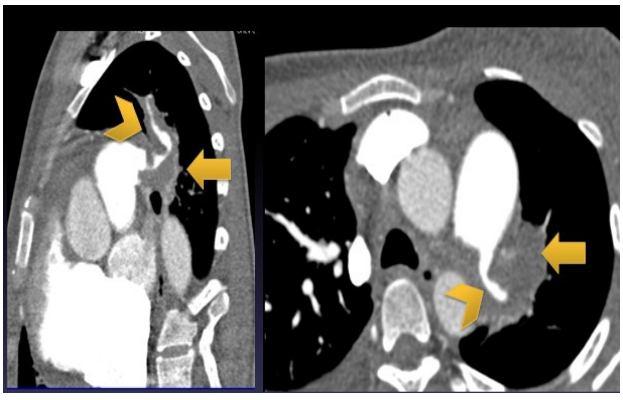

Figure 2. A CT angiography of the chest with contrast, delay 20 seconds, visible thrombus in the pulmonary artery. Chronic thrombus in the left pulmonary artery (arrow) and severe stenosis of the left pulmonary artery (arrowhead).

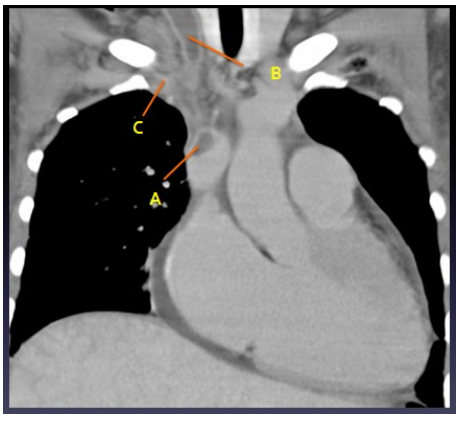

Figure 3. A CT scan of the chest with a contrast delay of 60 seconds. A thrombus appears in the vein. Thrombus in superior vena cava (A), jugular vein (B), subclavian vein (C).

techniques is a reasonably objective examination of APS patients suspected of DVT. Compression ultrasound is the diagnostic test of choice to identify DVT. The diagnostic criteria used is reduced compressibility of a vein segment, and Doppler can help accurately determine the vein and confirm the compressibility of a particular segment. The sensitivity of proximal compression ultrasound in evaluating suspected DVT reaches 97% (Chao *et al.,* 2023).

Clinical manifestation of intrathoracic venous thromboembolism on X-ray examination only shows Kerley B lines and peripheral interstitial thickening in addition to the classic signs of pulmonary hypertension (pulmonary artery/pulmonary trunk ectasia and cardiomegaly, especially in the right ventricle and atrium). CT scan is the modality of choice for diagnosing pulmonary vein thromboembolism. A CT scan can detect subtle thickening of interlobular septa, ground glass opacity, increased size of mediastinal lymph nodes, and pleural and pericardial effusion (Giangaspare Mineo *et al.,* 2014). Another study showed lung parenchymal abnormalities in APS with CT scan examination in air trapping, subpleural reticular pattern, lung cysts, and ground glass opacity centrilobular micronodules (Tzouvelekis, 2013). Previous studies have not discussed the significance of the scanning duration of a CT scan in detecting thrombosis in veins or arteries. This case report aims to describe a patient with antiphospholipid syndrome (APS) who has many blood clots in the chest on a CT scan and concerned about delayed scanning time.

2. Case

A 34-year-old woman came to the hospital with shortness of breath. The patient had been admitted to the hospital with a diagnosis of deep vein thrombosis (DVT) and was given an anticoagulant. Other complaints were fever, abdominal pain, history of swollen legs, bleeding cough, decreased appetite, and a 3 kg weight loss over three months. Physical examination: Body Mass Index (BMI) was average, thoracic examination found rhonchi in both lungs, left abdominal tenderness, and ECG examination showed normal sinus rhythm.

Chest radiography examination of the patient found cardiomegaly, bilateral pleural reactions, and minimal infiltrates in both the right perihilar and pericardiac areas. Hematology laboratory examination of D-dimer showed increased abnormalities in protein C and protein S. Echocardiography examination showed the impression of right heart failure et causa Chronic Thromboembolic Pulmonary Hypertension (CTEPH) and moderate tricuspid valve regurgitation. A contrast chest CT scan with an angiography protocol showed multiple intrathoracic thrombus (Figures 1, 2, 3).

3. Discussion

Antiphospholipid antibody syndrome (APS) is a condition that affects the blood clotting system, leading to the formation of numerous blood clots in arteries or veins. This can result in maternal complications and recurrent miscarriages owing to the presence of antiphospholipid antibodies (aPL). APS is caused by the immune system's production of antibodies against cell membranes (Oliveira *et al.,* 2020). The main target of antiphospholipid antibodies in APS is β2-glycoprotein I (β2GPI). β2GPI is a plasma protein that can bind to the surface of phospholipids, mainly when it binds to anti-2GPI antibodies. The binding of antiphospholipid antibodies to β2GPI on cellular surfaces can lead to the expression of prothrombotic cellular adhesion molecules such as E-selectin and tissue factor. The binding of antiphospholipid antibodies to β2GPI can suppress the inhibitory activity of the tissue factor pathway, reduce protein C activity, and activate complement.

Exposure of healthy donor platelets to antiphospholipid antibodies in vitro can increase the expression of glycoprotein IIb/IIIa, which is a fibrinogen receptor, and platelets play an essential role in prothrombotic interactions between antiphospholipid antibodies and endothelial cells. Neutrophil activation, tissue factor expression, neutrophil extracellular traps (NETosis) release, and interleukin-8 also play an essential role in forming thrombosis associated with antiphospholipid antibodies. Monocytes and microparticles derived from patients' monocytes showed high tissue factor expression. Microthrombotic antiphospholipid syndrome can partly be explained by antiphospholipid-antibody-induced upregulation of the mTOR (mechanism target of rapamycin) complex in endothelial cells, which can result in vasculopathy. Endothelial and trophoblast function abnormalities caused by complement activation can result in pregnancy complications and microthrombosis. Placental thrombosis and the interaction of antiphospholipid antibodies with decidual cells can also cause pregnancy complications (Chaturvedi & R McCrae, 2017; David Garcia, Doruk Erkan, 2018; Green, 2022). Thrombus forming in blood vessels, increased D-Dimer, protein C, and protein S abnormalities in this case are closely related to the pathophysiology of APS. The pathophysiology of APS shows an increase in tissue factor (TF) in monocytes and endothelial cells, interference with the protein C anticoagulant pathway, inhibition of fibrinolysis, and inhibition of annexin V binding to phospholipids.

APS primarily presents with thrombosis in arteries and veins, as well as pregnancy-related issues, including recurrent abortion, fetal mortality, pre-eclampsia, and intrauterine growth restriction. Thrombosis in different blood vessels and at other times and locations can lead to several clinical symptoms affecting several organ systems. Common clinical symptoms of thrombosis in APS patients are stroke, pulmonary embolism, pregnancy complications, livedo reticularis, thrombocytopenia, and DVT. Thrombosis in retinal veins and adrenal glands are uncommon symptoms in APS, occurring in 10-20% of cases. Clinical symptoms occurring in less than 10% of cases include epilepsy, vascular dementia, pulmonary hypertension, portal vein thrombosis, Budd-Chiari syndrome, osteonecrosis, finger gangrene, amaurosis fugax, chorea, and foot ulcers. Less than 1% of cases have clinical symptoms such as cardiac valve dysfunction and coronary artery disease (Schreiber *et al.,* 2018; Sciascia *et al.,* 2015). The diagnosis of APS is based on clinical criteria and laboratory criteria. Clinical criteria for APS are vascular thrombosis and pregnancy disorders. Laboratory criteria defined as the presence of antiphospholipid antibodies in ≥2 tests with a distance of ≥12 weeks, identified as one or more of the following: presence of lupus anticoagulant (LA); IgG/ IgM anticardiolipin antibody (aCL) in serum or plasma; medium-high titer of anti-β2GPI IgG or IgM antibody (Knight *et al.,* 2023).

Vascular thrombosis is a significant complication of APS disease (Mora-Ramírez *et al.,* 2016). CT angiography is the imaging modality of choice in diagnosing patients with thrombi in veins or arteries, with sensitivity and specificity values of 83% and 96%. CT angiography is an examination available in hospitals. It is minimally invasive and fast, with a scan duration of less than one second. CT angiography can provide direct visualization of the thrombus. CT angiography examination is carried out by administering contrast material intravenously, which can cause contrast-induced nephropathy (CIN), so it cannot be performed in patients with a low glomerular filtration rate (GFR) (Moore *et al.,* 2018; Saponjski *et al.,* 2017). An acute thrombus on an axial cut will show a polo mint sign, a filling defect in the central lumen surrounded by contrast material. Thrombus can be occlusive or non-occlusive. The thrombus in the lumen will form an acute angle to the lumen wall of the blood vessel, and the affected blood vessel may become lumen widening. CT angiography of chronic thrombus can manifest as intraluminal tissue, calcification, thrombus recanalization, and filling defects that form an obtuse angle to the lumen wall of the blood vessel. Chronic thrombus causes blood vessels to be smaller than normal, abnormal tapering, and disconnection of blood vessels (Dogan *et al.,* 2015; Moore *et al.,* 2018).

CT angiography is very important in patients suspected of a thrombus in a blood vessel (El-Menyar

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et al., 2016). CT scan methods may differ based on the indication to enhance contrast in the detected blood vessels. Additionally, it is essential to consider the scanning time in vascular CT scans. A delay of 10-15 seconds may occur while scanning the pulmonary artery for pulmonary embolism, whereas a delay of 20-30 seconds may occur when scanning for anomalies in the aorta. The CT angiography with contrast showed several intrathoracic blood clots in the pulmonary artery, superior vena cava, jugular, and subclavian veins (Figure 1). Figure 2 shows a scan delay of 20 seconds, and a thrombus in the pulmonary artery is visible. The image of a thrombus in the jugular and subclavian veins shows a scan delay of 60 seconds (Figure 3). Therefore, the right scanning time is needed to get an image of a thrombus in either an artery or a vein.

This case report is in line with research by Sugiyama *et al.,* who reported a case of a woman diagnosed with APS accompanied by CTEPH and coronary artery disease. The patient has hypoxia without chest pain and has never been pregnant. Laboratory examination showed a mild increase in antiphospholipid antibodies, lupus anticoagulant, and anti-2-glycoprotein I antibodies. Radiographic examination and chest CT scan revealed cardiomegaly, especially in the right atrium and ventricle, accompanied by a widening of the pulmonary arch. Pulmonary angiography examination revealed irregularity of the intima and narrowing of both pulmonary arteries (Sugiyama *et al.,* 2020).

4. Conclusions

Patients with deep vein thrombosis (DVT) abnormalities and thrombus in various tissues and organs need to be suspected of APS. APS patients with blood clotting disorders must have DVT detected early with vascular ultrasonography and thrombus detection with CT angiography. Several phases of CT angiography are needed to evaluate blood vessels, both arteries and veins.

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Conflict of interest

All authors have no conflict of interest in this article.

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