

CASE REPORT

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Pulmonary embolism originating from germ cell tumor causes severe left ventricular dysfunction in a healthy young adult with full recovery: a case report

Khaled Elenizi^{1,2*} , Rasha Alharthi¹  and Michel Galinier¹ 

Abstract

Background: Cancer associated thrombosis is recognized. However, pulmonary embolism (PE) from testicular cancer is rarely reported. Right ventricular (RV) function and PE are closely related. The RV cannot cope with a sudden increase in afterload because of PE and this causes dysfunction, but isolated left ventricular dysfunction in this context is not reported in the literature.

Case presentation: We report an unusual association of pulmonary embolism and testicular germ cell tumor complicating severe left heart failure and full recovery at three months follow up in a 33-year-old patient with no prior medical history. The diagnosis was made after comprehensive history taking and physical examination with the help of different imaging modalities. Full recovery was achieved after optimal medical therapy.

Conclusion: This case raises our awareness of unusual clinical presentation as we report associated left-sided severe heart failure in cancer-related pulmonary embolism. Pulmonary embolism in healthy young adults warrant in-depth causative exploration.

Keywords: Pulmonary embolism, Heart failure, Testicular cancer, Left ventricle, Case report

Background

Pulmonary embolism (PE) affects around 430,000 individuals in Europe [1] and between 300,000 and 600,000 individuals in the United States each year [2]. Eighty percent of cases are caused by deep vein thrombosis (DVT) [3]. Cancer increases PE risk by 4.1 folds [4]. When DVT migrates to the pulmonary circulation, it's called venous thromboembolism (VTE). Predisposing risk factors such as recent trauma, surgery, hospitalization or immobility can be identified in 50% of cases [5]. In case of

unprovoked PE, search for thrombophilia state or cancer is warranted [6, 7]. Thrombosis and cancer have a strong relationship with different mechanisms in thromboembolic events [8]. Cancer patients represent 20% of pulmonary embolism cases and in 15% of all cancer patients VTE is present [9]. Tissue factor-factor VII complex is known to be involved in the mechanism of hypercoagulability in cancer patient [10] while factor II is not. The most dangerous and life-threatening clinical manifestation of VTE is PE and could lead to cardiogenic shock. Direct relation to RV dysfunction and PE is well established, but no direct association in literature is found for LV dysfunction. We report an unusual clinical scenario for left-sided heart failure diagnosed in the setting of PE

*Correspondence: kelenizi@yahoo.com

¹ Department of Cardiology, CHU-Toulouse, University Hospital of Toulouse, Hôpital Rangueil, 1 Avenue Jean Poulhès, 31059 Toulouse, France

Full list of author information is available at the end of the article



for which testicular cancer was the only relevant predisposing factor in a healthy young adult.

Case presentation

A 33-year-old male smoker with no prior medical history came to the emergency department with sudden onset dyspnea and hemoptysis associated with lower limb edema. The physical examination found: heart rate 125 bpm, regular sinus rhythm with no added sounds, blood pressure 240/130 mmHg, polypnea at 45 breaths per minute, normal oxygen saturation, limited bilateral air entry with crepitation, lower limbs pitting edema, hepatojugular reflex, no evidence of deep vein thrombosis, normal abdominal examination. Biological markers were hemoglobin 15 g/dl, white blood cells 16 G/l, CRP 87 mg/L, ProBNP 3612 pg/mL, stable troponin at 76 ng/ml, sodium 133 mmol/L, potassium 4.7 mmol/L, creatinine 100 μmol/L.

Investigations

ECG showed regular sinus tachycardia at 110 bpm, ST depression and T waves inversion in infero-lateral leads. Chest x-ray showed cardiomegaly with bilateral hilar congestion (Fig. 1). Computed tomography (CT) pulmonary angiogram revealed distal pulmonary embolisms in inferior lingular segment at the upper lobe, lateral and posterior segments in lower lobe with associated infarctions (Figs. 2 and 3). Transthoracic echocardiography revealed dilated cardiomyopathy, left ventricular indexed end diastolic volume 237 ml/m², end systolic volume 168 ml, global hypokinesia, LVEF 29%, LV strain -9%, moderate functional mitral regurgitation, right ventricle with normal function, TAPSE 20 mm, PAPS 45 mmHg, low cardiac output 3.4 l/ min (Fig. 4). Patient subsequently

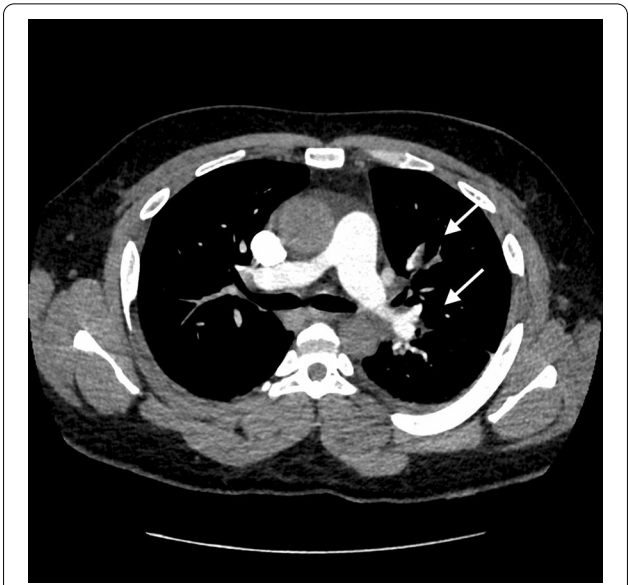


Fig. 2 Computed tomography (CT) pulmonary angiogram shows distal pulmonary embolisms in inferior lingular segment at the upper lobe, lateral and posterior segments in lower lobe

underwent Coronarography that revealed no significant coronary artery disease and LVEF at 27% on ventriculography. The assessment of LV global hypokinesia was completed with cardiac MR that showed dilated cardiomyopathy indexed end diastolic volume 200 ml/m², no late gadolinium enhancement, no evidence of other anomalies. Patient subsequently developed left pleural effusion with superinfection drained 2 times of inflammatory serohematic fluid but no neoplastic cells were found (Fig. 5).

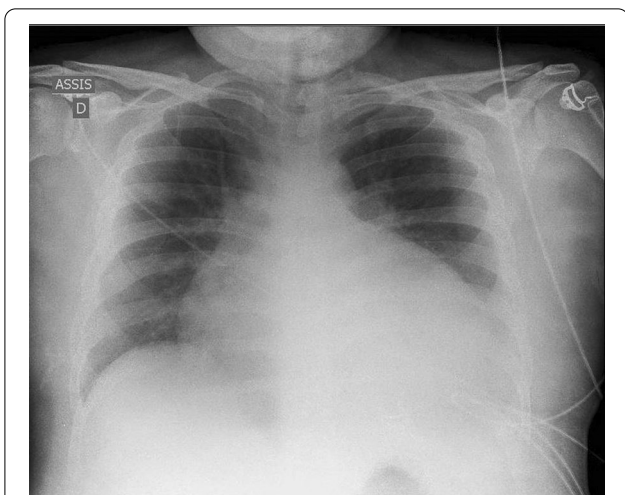


Fig. 1 Chest x-ray shows cardiomegaly with bilateral hilar congestion

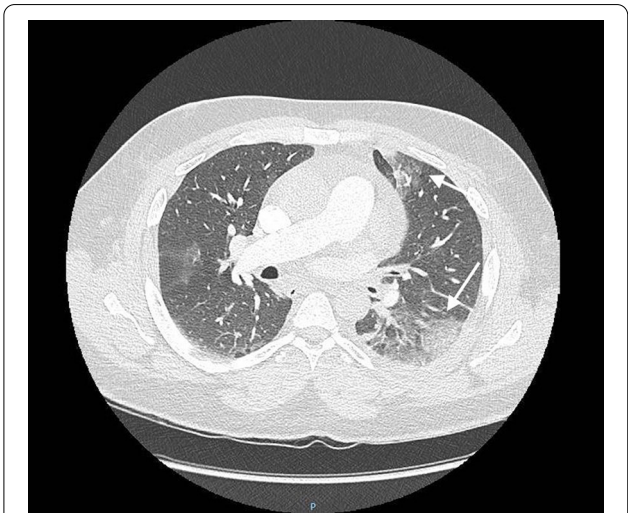


Fig. 3 Computed tomography (CT) of the pulmonary parenchyma shows associated infarctions corresponding with ischemic lesions

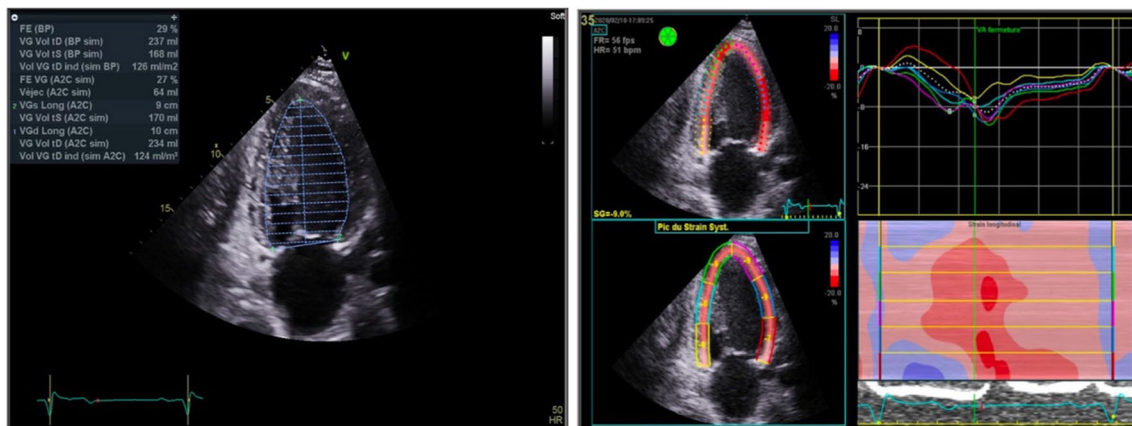


Fig. 4 Transthoracic echocardiography shows LV parameters (left) and LV strain (right)

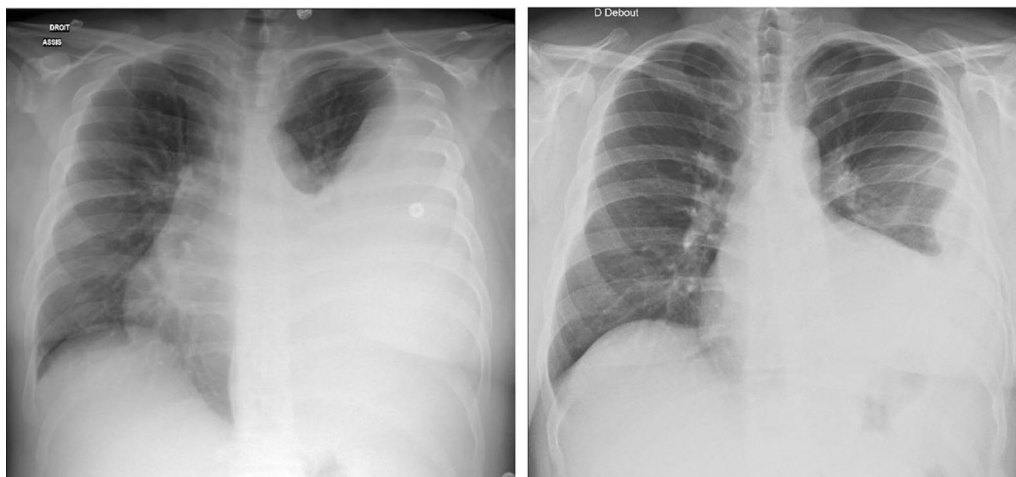


Fig. 5 Chest x-ray shows left pleural effusion with superinfection before drainage (left) after drainage (right)

Differential diagnosis

To look for the cause of pulmonary embolism an extensive workup was carried out with computed tomography (CT) of the abdomen, pelvis and brain showing no abnormalities. Testicular ultrasound showed vascularized right testicular mass with calcifications measuring 28X23 mm (Fig. 6). Genetic testing found Testicular germ cell tumor classification UICC/TNM 2016 pT1, R0. Beta Human chorionic gonadotrophin (β HCG) measured at 39 UI/L, alpha fetoprotein (AFP) at 3 ng/ml and lactate dehydrogenase (LDH) 183 U/L all normal. Hematological testing found Factor II Mutation with heterozygous Factor II genotype; Factor V Leiden was normal. No etiological origin was found for the LV dysfunction except PE.

Treatment

Heart failure with reduced ejection fraction treatment was started with ramipril 2.5 mg once daily, spironolactone 25 mg once daily, bisoprolol 5 mg once daily and diuretics. Intermediate high-risk pulmonary embolism treatment was shifted from heparin to Xarelto after assuring haemodynamic stability. Testicular cancer was treated with right orchidectomy through an incision in the lower lateral abdomen.

Outcome and follow-up

At 3 months follow up, the patient showed great improvement with the following parameters; LVEF from 29 to 55%, LV telediastolic volume normalized from 237 to 100 ml/m², LV strain from -9 to -15% with the

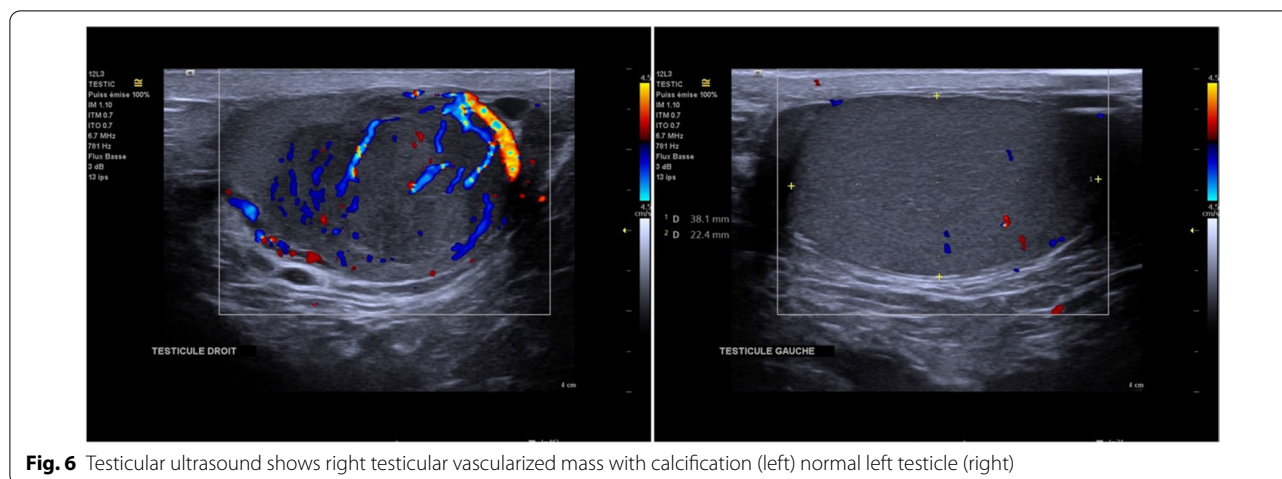


Fig. 6 Testicular ultrasound shows right testicular vascularized mass with calcification (left) normal left testicle (right)

disappearance of the pulmonary hypertension. In this context, no therapeutic modification was made with no indication for ICD. The patient stated a big improvement in symptoms in this period.

Discussion and conclusion

Testicular cancer accounts for around 1–1.5% of male cancers and affects younger males in their third or fourth decade of life mainly [11]. Testicular cancer is not on the top list of thrombogenic cancers but is a possible source of neoplasm-related coagulopathy [12]. Cancer therapy is a major cause of VTE but our patient was not diagnosed before [13]. VTE in cancer has a complex pathophysiology but result generally from coagulation factors activation [14]. Inheriting one copy of the mutation in the F2 gene raises the chance of 2 or 3 in 1000. Persons who inherit two copies of the gene, one from each parent, may be at risk as much as 20 in 1000. [15]. Thrombophilia due to factor 2 gene mutation is considered hereditary with no cancer association and manifest mainly by DVTs [16]. In our case, we found heterozygote FII mutation rising the question if it is an accidental or a causative realtion.

To our awareness, only one case has been reported where PE was the first manifestation of testicular cancer [17], but surprisingly our case has left-sided severe heart failure and PE as the first manifestation of testicular cancer. Comprehensive history taking remains the ultimate tool in the search for unusual underlying pathologies, as testicular cancer has been identified in our case due to comprehensive interrogation.

Suitable diagnostic imaging modality is of great importance, as full body scan in our patient has not been able to detect the testicular mass and ultrasonography was the right diagnostic tool.

In our case, optimal medical therapy resulted in complete recuperation of left ventricular dysfunction and disappearance of the pulmonary hypertension within 3 months. We do not know whether PE has a cause - effect relationship with LV dysfunction or it was simply a triggering event in a previously failing heart.

Learning points/take home messages

1. Cancer should be considered as a cause of pulmonary embolism even at young ages
2. Comprehensive history taking is very important
3. Multimodality imaging is helpful for diagnosis and management
4. Awareness of unusual clinical associations

Abbreviations

PE: Pulmonary embolism; RV: Right ventricle; LV: Left ventricle; DVT: Deep venous thrombosis; VTE: Venous thromboembolism; CT: Computed tomography; LVEF: Left ventricular ejection fraction; TAPSE: Tricuspid annular plane systolic excursion; PAPS: Systolic pulmonary arterial pressure; MR: Magnetic resonance; OD: Once daily; ICD: Intracardiac defibrillator; PHT: Pulmonary hypertension.

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Authors' contributions

RA analyzed, interpreted the patient data, performed the literature review and drafted the manuscript. KE analyzed, interpreted the patient data, performed the literature review and drafted the manuscript. MG participated in data interpretation and critically revised the manuscript. All authors read and approved the final manuscript.

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Consent for publication

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Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Cardiology, CHU-Toulouse, University Hospital of Toulouse, Hôpital Rangueil, 1 Avenue Jean Poulhès, 31059 Toulouse, France. ²Department of Internal Medicine, College of Medicine, Prince Sattam Bin Abdulaziz University, Alkharj 11942, Saudi Arabia.

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