Case report of a pulmonary embolism in a patient with inferior vena cava compression by an 11 × 28 cm abdominal benign tumor

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ABSTRACT

Background: Pulmonary embolism (PE) is a life-threatening condition causing an abrupt reduction in blood flow in the pulmonary vasculature due to a migrating thrombus. The most cases are related to thromboembolism events originating in the lower limbs. However alternate etiologies should be suspected in certain clinical cases mainly in young patients with no risk factors.

Case Presentation: We present a case of a young patient with proximal PE caused by compression on the inferior vena cava by an abdominal benign tumor measuring 11 × 28 cm. The patient was treated surgically and started on a therapeutic dose of Anticoagulation. The etiology of PE in this case was attributed to large vein compression promoting blood stasis and leading to thrombus formation.

Conclusion: In short, acute PE in young female patients, is unusual and should raise suspicion for miscellaneous causes including vascular compression by tumors.

Keywords: PE, inferior vena cava, thromboembolism, benign tumor, serous ovarian cystadenoma, abdominal tumor.

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Background

The occurrence of pulmonary embolism (PE), especially in young individuals, should always raise the suspicion of an underlying cause [1]. In these patients, we need to rule out a state of hypercoagulable state in the absence of other reversible causes such as trauma, surgeries, and long periods of immobilization [1]. These causes include alteration and mutation in the coagulation pathway such as the factor V leiden mutation, antithrombin III deficiency, prothrombin gene mutation, and protein C and S deficiency [2]. Other causes of hypercoagulable states include tumors which are diagnosed by imaging and by measuring the tumor markers in the blood [3,4]. In an important number of patients with unprovoked PE, we find underlying malignancies [5]. A less common cause of PE is a stasis of blood in the venous system which may be due to an external compression of a vein by a structure such as a tumor [6]. Blood stasis will promote a state of hypercoagulability and thrombus formation with a risk of embolization to the lungs. It is important to detect a cause of PE, mainly in young patients to treat the underlying condition and prevent recurrences [1]. A provoked venous thromboembolism event is treated with 3–6 months of anticoagulation while a nonprovoked event is treated with a longer duration of anticoagulation [7,8].

Case Presentation

A healthy 22-year-old female, with no significant family history and no significant personal history presented to the emergency department for shortness of breath. She was found to have a significantly elevated DDimer level raising the suspicion of PE. A thoracic CT angiography showed bilateral proximal filling defects in pulmonary arteries confirming the diagnosis of bilateral proximal PE (Figure 1). The lower limbs venous ultrasound

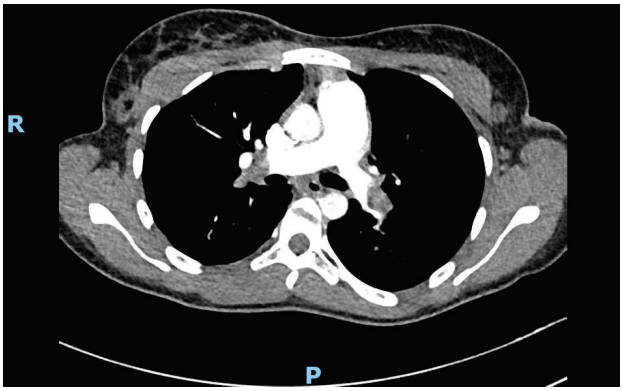

Figure 1. *Chest CT angiography showing filling defects in the bilateral proximal pulmonary arteries with a diagnosis of bilateral proximal PE.*

was negative for deep venous thrombosis. An abdominal ultrasound showed evidence of a large structure of cystic characteristics, so an abdominal magnetic resonance imaging (MRI) was ordered, and it showed an intraperitoneal extraovarian cystic structure of 11 × 28 cm which looks like a cystic lymphangioma or cystic mesothelioma compressing the inferior vena cava (IVC) (Figures 2,3). The patient underwent surgery, and the cyst was drained. Pathologic examination of the tissue showed (Figures 4–6). The patient was treated with Enoxaparin initially and after her surgery was switched to Rivaroxaban.

Discussion

PE is an acute life-threatening condition that occurs when the pulmonary artery or any of its branches gets obstructed by the migration of a thrombus formed elsewhere in the body into the pulmonary circulation [9].

Although PE can be idiopathic, it is most often associated with risk factors described as the Virchow triad consisting of stasis, vessel wall damage, and hypercoagulability. Stasis results from changes in blood flow caused by factors such as turbulence in branches and irregular vessel lumens [10]. Other conditions that cause congestion include immobilization, limb paralysis, heart failure, varicose veins, and chronic venous insufficiency [11]. Compression of the IVC by intra-abdominal masses has been described in the literature; the triggers are often malignant diseases [12], ruptured AAA [13], hepatic hemangioma [14], and desmoid tumor [15].

In our case, an intraperitoneal extraovarian cystic tumor was found to be compressing the IVC causing stasis and clot formation leading to bilateral proximal PE.

Acute PE can present with pleuritic chest pain and dyspnea. Proper diagnosis can sometimes be challenging due to nonspecific symptoms. The diagnosis of this condition is often made through a thorough taking history of the patient's presentation and risk factors in addition to

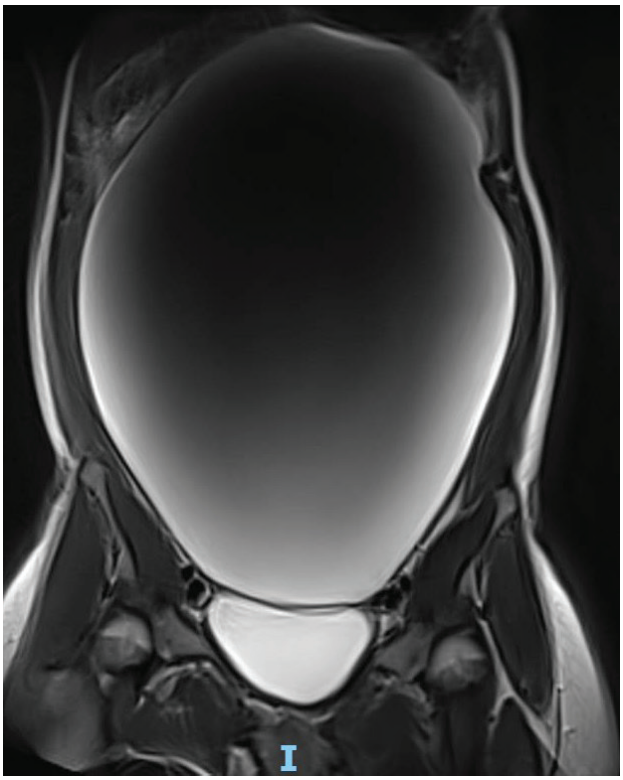

Figure 2. *Very large cystic tumor measuring 11 × 28 cm on magnetic resonance imaging of the abdomen and pelvic area.*

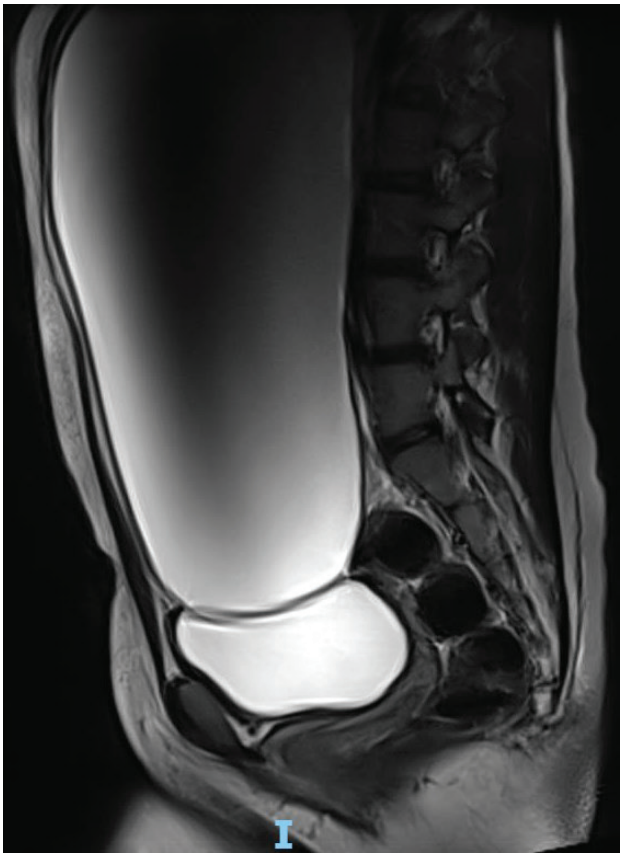

Figure 3. *Very large cystic tumor measuring 11 × 28 cm on magnetic resonance imaging of the abdomen and pelvic area.*

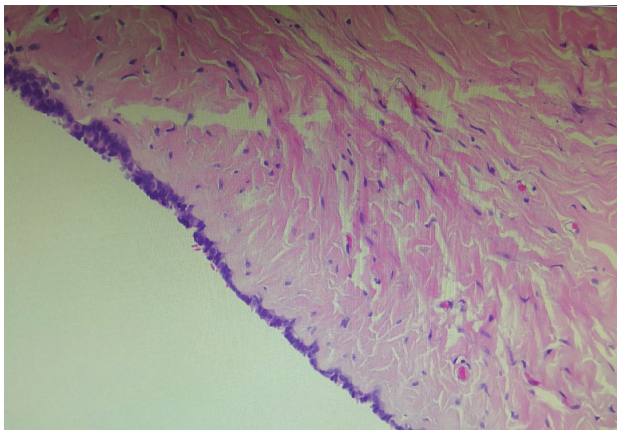

Figure 4. *Ovarian serous cystadenoma as seen on pathology examination post operatively.*

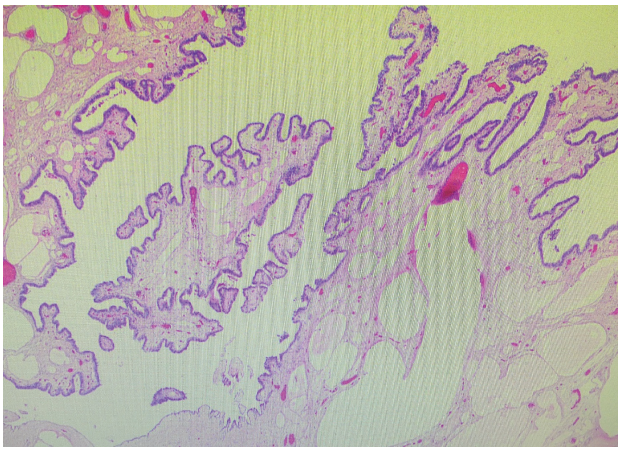

Figure 5. *Ovarian serous cystadenoma as seen on pathology examination post operatively.*

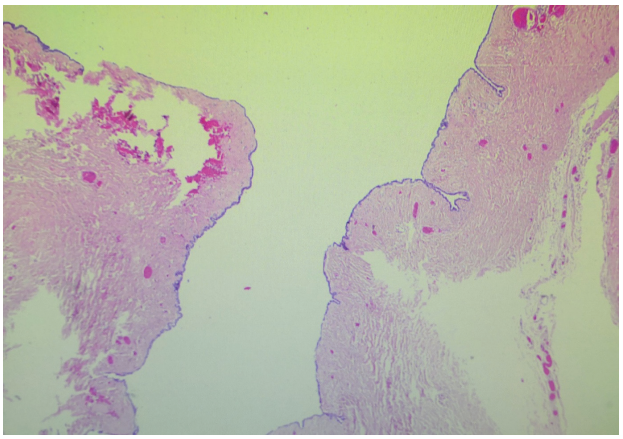

Figure 6. *Ovarian serous cystadenoma as seen on pathology examination post operatively.*

a focused physical examination. The likelihood of having PE is then clinically assessed by Wells criteria and confirmed by the detection of emboli on imaging studies mainly computed tomography scans (CT scans). After diagnosis patients are risk stratified for further management [16].

In the case of our patient, the diagnosis of bilateral proximal PE was confirmed by CT scan while the tumor causing the compression was incidentally detected on chest imaging. Further evaluation of the tumor by MRI described an intraperitoneal extra ovarian cystic formation without wall thickness or vegetation measuring 11cm × 28 cm resulting in a mass effect on the IVC. Surgery was performed during which the tumor and the left ovary were excised. The excised specimen was sent to pathology that showed ovarian serous cystadenoma.

Serous cystadenoma is a rare adolescent ovarian tumor that arises from the surface epithelium of the ovary. Depending on the amount of fibrous tissue, it can be classified as cystadenoma, cystadenofibroma, adenofibroma, papillary cystadenoma, papillary cystadenofibroma, or papillary cystadenofibroma. Serous cystadenomas are usually oval, about 3–10 cm in diameter, with a glossy surface and clear to yellowish cystic fluid [17].

Serous ovarian cystadenoma has previously been described in two adolescents, one presenting with abdominal distension and pain [18], and the other presenting with abdominal pain [19].

Ovarian serous cystadenoma is a tumor that although benign in nature, could rarely lead to life-threatening effects due to its mass effect [20]. By compressing the IVC, ovarian cystadenoma could lead to thrombus formation and subsequent PE [6].

Treatment of PE in such cases requires immediate initiation of anticoagulation therapy in addition to surgical removal of the cystadenoma to relieve its mass effect and prevent further thrombotic and embolic events [7,8]. The patient in our case was initially started on a therapeutic dose of subcutaneous enoxaparin, which was later stopped 12 hours before surgery through which she underwent cystectomy and oophorectomy, enoxaparin was later resumed for 6 months.

Conclusion

In short, acute PE in young female patients is unusual and should raise the suspicion for miscellaneous causes including vascular compression by tumor growths, such as ovarian serous cystadenoma. Proper evaluation and early diagnosis of these cases is crucial, as appropriate management includes surgical excision of the tumor causing the compression in addition to anticoagulant therapy, thus leading to favorable outcomes and preventing subsequent PE recurrences.

What is new?

PE is not a rare finding in malignant tumors but what is novel in this manuscript is that the PE originated due to the compression of the inferior vena cava by the tumor that caused venous status.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Written and informed consent was taken from the patients to publish this case report.

Ethical approval

Approval and consent of the ethics committee institutional review board were received for the publication of this article.

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Summary of the case

1	**Patient (gender, age)**	Female, 22-year-old
2	**Final diagnosis**	PE
3	**Symptoms**	Shortness of breath
4	**Medications**	Enoxaparin
5	**Clinical procedure**	Surgical removal of the cyst followed by enoxaparin
6	**Specialty**	Cardiology