Intravenous Leiomyomatosis: An Uncommon Cause of Pulmonary Embolism.

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Abstract

Patient: Female, 39-year-old

Final Diagnosis: Intravenous leiomyomatosis

Symptoms: Dyspnea • syncope

Medication: —

Clinical Procedure: —

Specialty: Cardiology • Critical Care Medicine • General and Internal Medicine

Objective:

Rare disease

Background:

Intravenous leiomyomatosis (IVL) is a rare benign smooth muscle tumor originating in the uterus or in the uterine vessels. It is characterized by continuous intraluminal growth that may extend through iliac veins and inferior vena cava (IVC) to right chambers of the heart and pulmonary vasculature, leading to life-threatening complications. This case report describes an uncommon cause of non-thrombotic pulmonary embolism in young woman caused by extensive IVL.

Case Report:

A 39-year-old woman was admitted after multiple syncopal episodes. She was initially found to have a bilateral pulmonary embolism and large right atrial mass believed to be a thrombus. After an unsuccessful attempt to remove the thrombus with AngioVac (AngioDynamics, Latham, NY), subsequent sternotomy revealed a large pedunculated mass extending to the infra-hepatic IVC. Further abdominal imaging showed multiple uterine masses, with the largest about 17 cm, infiltrating the parauterine vessels and extending through the right iliac vein and inferior vena cava up to the right atrium. Pathology examination of the atrial mass revealed benign leiomyoma consistent with further pathology findings after hysterectomy. The pulmonary embolism was believed to be caused by tumor tissue, and anticoagulation was abandoned. Pulmonary nodule raised a suspicion of benign pulmonary metastases, but, fortunately, remained stable during follow-up and the patient had a successful recovery.

Conclusions:

Available information about IVL is scarce. This tumor, although benign and rare, should be included in the differential diagnosis of cardiac tumors and non-thrombotic pulmonary emboli in women with predisposing risk factors, as potential complications are life-threatening.

Keywords: Heart Neoplasms, Leiomyomatosis, Pulmonary Embolism

Background

Intravenous leiomyomatosis (IVL) is a rare benign tumor characterized by continuous intraluminal growth, found predominantly in premenopausal women. The initial presentation is often insidious and depends on the tumor size and vascular involvement, as it may extend from pelvic veins, through iliac veins and inferior vena cava (IVC) into right chambers of the heart, in rare cases affecting pulmonary vasculature by continuous growth or by formation of non-thrombotic pulmonary emboli (NTPE) [1,2]. This may have significant clinical implications, as pulmonary embolism is one of the most common causes of cardiovascular death; however, it is predominantly caused by venous thrombi [1–3]. NTPE emboli are rare and usually overlooked during initial evaluation impeding treatment. Therefore, we present a case of a non-thrombotic pulmonary embolism triggered by extensive intracardiac IVL.

Case Report

A 39-year-old obese (BMI 40 mg/m^2) woman with no significant past medical history presented to the Emergency Department with dyspnea. The patient had recently traveled to Israel, where she experienced several witnessed pre-syncopal and syncopal episodes while hiking, along with intermittent shortness of breath on exertion and progressive mild bilateral lower extremity edema. The patient emphasized that she was not taking any medications prior to admission, including over-the-counter medications and oral contraceptives. She had never smoked and had no family history of thromboembolic events or cancer. On admission, the patient was afebrile, hypertensive, and tachycardic, with oxygen saturation of 100% on room air. The physical examination was otherwise unremarkable. Initial hemogram, blood chemistry, and troponin levels were normal. A CT angiogram of the chest revealed left lower lobe subsegmental pulmonary embolism (PE), a 5-mm pulmonary nodule, and hypoattenuating area in the right atrium measuring 4.2 cm, with relative enlargement of the visible portion of the IVC, suggesting the a possible underlying IVC thrombus. Ultrasound Doppler imaging of the lower extremities did not reveal any sings of lower extremity deep venous thrombosis. A subsequent 2D echocardiogram showed a 2.4×2.0-cm right atrium thrombus intermittently prolapsing into the right ventricle. Intravenous heparin treatment was initiated followed by confirmatory transesophageal echo, revealing a larger, 6×-cm mobile prolapsing mass, and cardiac MRI showed a large filling defect consistent with thrombus or possible mass extending from the IVC to the right atrium. Multidisciplinary discussion took place and a decision was made to attempt urgent surgical removal due to the size of the mass. The patient underwent an unsuccessful attempt to remove the thrombus with AngioVac (AngioDynamics, Latham, NY), and the procedure was transitioned to open sternotomy. A large pedunculated mass extending to at least the level of the infra-hepatic IVC was found and transected as distal as possible (**Figure 1**). Postoperative imaging with CT scan of the abdomen and pelvis showed an enlarged uterus with multiple masses, the largest measuring 17×11×11 cm and a filling defect extending into the right iliac vein, common iliac vein, and IVC, which is shown below, presenting as enhancing tumor thrombus. Subsequent MRI with angiogram of the abdomen and pelvis showed heterogenous signal in the parauterine vessels extending into the internal iliac vein (**Figure 2**). Pathology of the RA mass revealed benign leiomyoma (**Figure 3**) and the patient underwent uterine artery embolization. This also raised further questions about the role of anticoagulation in the presumptive PE, as high probability existed that the embolism was caused by the tumor itself. After multidisciplinary discussion, it was decided that the fibroid tissue was the most likely etiology of the PE and the plan for long-term anticoagulation was abandoned.

Figure 1.
Right atrial mass.

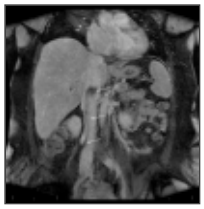

Figure 2.
Contrast-enhanced MRI of the abdomen after cardiac mass resection, revealing filling defect in mid- to inferior vena cava, extending up to the level of the liver (arrows).

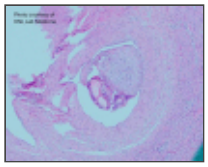

Figure 3.
Pathology of right atrial mass, revealing benign leiomyoma.

Unfortunately, her treatment course was complicated by acute appendicitis 2 months after the initial presentation, delaying the planned total abdominal hysterectomy (TAH) with bilateral salpingo oophorectomy (BSO). After a successful appendectomy, a multidisciplinary team performed IVC exposure and cavotomy with tumor extraction followed by TAH with BSO. The postoperative period was uncomplicated, and the patient had a successful recovery.

Discussion

IVL is an extremely rare tumor that affects predominantly women of reproductive age, as it expresses both estrogen and progesterone hormone receptors. The etiology is unknown; however, the hypothesis is that it originates from the smooth muscles of the uterine vessels or by intraluminal

invasion of the uterine fibroids [4]. Initial presentation is often vague, with a variety of clinical symptoms dependent on the origin, size, and growth of the tumor. Patients can experience abdominal pain, fullness, or menorrhagia when large leiomyomas are present. Interestingly, more that 50% of IVL is found in women that had prior hysterectomy due to uterine leiomyoma. Moreover, many of these tumors present years after a hysterectomy was performed. However, it is unclear if in these cases IVL is related to subsequent invasion of the vessels, or if the presence of IVL at the time of hysterectomy was unknown [2]. Most dangerous complications occur when tumor growth involves renal vessels, the heart, or even pulmonary circulation, leading to dyspnea, syncope, or even sudden cardiac death.

Pulmonary circulation can be affected by continuous intraluminal growth, non-thrombotic pulmonary embolism (NTPE), or even benign metastatic lesions [5]. NTPE pose a significant diagnostic challenge and are often overlooked. They are formed by a variety of cell types, including adipocytes, amniotic, trophoblastic, and neoplastic cells, as well as foreign or infectious material [6]. IVL as a cause of NTPE is exceptionally rare, the diagnosis difficult, and based on comprehensive clinical history and imaging including CT scan with contrast, ECHO and often MRI [7]. Unfortunately, due to the diagnostic challenges, the final diagnosis is often made at the time of surgery or when repeated imaging reveals persistent pulmonary embolism not responsive to anticoagulation therapy [5,7]. Our patient presented with symptoms and findings suggestive of PE with a large right atrial mass. The etiology of PE was unclear at the onset. Large thrombus or right atrial myxoma were considered the most likely initial diagnosis as they are the most common etiologies of atrial tumors [8]. The patient had no abdominal or genitourinary complaints; therefore, abdominal imaging was not performed on admission. The large size of the cardiac mass with suspicion of thrombotic etiology was highly concerning, as mortality reaches 27.1% when right heart thromboembolism is present [9]. This prompted the decision of surgical removal to prevent life-threatening complications and the diagnosis was made after pathology examination of the resected pedunculated mass. In this case, the two-stage surgery was dictated by the potential life-threatening large cardiac mass of uncertain etiology. Nonetheless, the current approach to treat IVL with cardiovascular involvement is by one- or two-stage procedure, with the latter chosen by some physicians as being less invasive [10]. The importance of radical resection should be further emphasized, as reoccurrences of IVL are not unusual [11].

Furthermore, IVL is known to cause benign metastases in the lungs, liver, skin, lymph nodes, esophagus, bladder, or even spine, with the lung being the most common metastatic location [12,13]. Although most cases of benign pulmonary metastases described in the literature presented as multiple pulmonary nodules, this etiology could not be excluded in our patient with a small 6-mm pulmonary nodule. Therefore, close follow-up of the chest CT scan was planned and repeat imaging after 3 and 12 months was performed and revealed stable size of the nodule. There are no guidelines for the treatment of benign IVL pulmonary metastases, and some case reports even suggest the benefit of gonadotropin-releasing hormone treatment to prevent pulmonary metastases growth [14].

Conclusions

Information on IVL with cardiovascular involvement is scarce, which poses a significant diagnostic challenge. It is important to include it in a differential diagnosis in women with NTPE with existing risk factors for leiomyomatosis. Currently, there are no guidelines for treatment of IVL, but our experience, supported by the available literature, suggests that radical resection should be attempted in every such patient.

Footnotes

Conflict of Interest

None.

Article information

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Authors' Contribution:

[A]Study Design

[B]Data Collection

[C]Statistical Analysis

[D]Data Interpretation

[E]Manuscript Preparation

[F]Literature Search

[G]Funds Collection

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