A Rare Case of an Abdominal Aneurysm in a Patient with Lymphangioleiomyomatosis: A Case Report

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ABSTRACT

Introduction: Lymphangioleiomyomatosis (LAM) is a multisystemic disorder characterized by the proliferation, metastasis, and infiltration of smooth muscle cells in the lung and other tissues. Although LAM is rarely seen in men, it is usually detected in women during the third decade of life. Renal microaneurysms have been reported in patients with LAM, but abdominal aneurysms have not. We describe a patient with a diagnosis of LAM who had an unusual aneurysm in the inferior pancreaticoduodenal artery.

Case Presentation: A 47-year-old Ecuadorian woman self-referred for a routine visit to her family physician. She had a history of allergy to nonsteroidal anti-inflammatory drugs, pneumothorax, bilateral pleurodesis, and LAM since 2007. For her annual follow-up, an ultrasonogram was recommended. The abdominal ultrasonographic report described "a mass with blood flow in the midabdomen." An abdominal computed tomography angiogram was performed and revealed a 2.6-cm aneurysm of the inferior pancreaticoduodenal artery. After diagnosis of arterial aneurysm, she underwent transcatheter arterial embolization and stent placement. She is currently healthy and carries out her activities normally.

Discussion: Lymphangioleiomyomatosis is a rare lung disease of unknown etiology. Extrapulmonary manifestations include abdominal aneurysm. This type of lesion should be added to a search for aneurysms in all patients with LAM.

INTRODUCTION

Lymphangioleiomyomatosis (LAM), a member of a family of neoplasms with perivascular epithelioid differentiation, is a multisystemic disorder characterized by the proliferation, metastasis, and infiltration of smooth muscle cells (SMCs) in the lung and other tissues. The disorder is thought to be caused by the loss of the tuberous sclerosis complex-2 (*TSC2*) gene heterozygosity in the chromosome 16p13.[1] This loss produces an alteration in the function of tuberin, an activation of the mammalian target of rapamycin (mTOR), with the consequent overexpression of several kinases.[1]

This chronic disease can occur either sporadically or, in 13% to 40% of cases, is associated with tuberous sclerosis (TSC/LAM).[1,2] Whereas LAM is rarely seen in men, in women it is usually detected during the third decade of life, with a prevalence ranging between 3 and 7.8 per million women.[2] It is characterized by the presence of pulmonary cysts; however, other lesion sites are also identified in the kidneys (angiomyolipoma) and the lymphatic system (lymphangioleiomyoma).[1] These findings are frequent in TSC and TSC/LAM, and particularly in these cases, the presence of intracranial,[3] renal,[4] lung,[5] or abdominal aortic[6] aneurysms have been reported. Champagnac et al[4] have reported renal microaneurysms in patients with LAM; however, to our knowledge, abdominal aneurysms have not been associated with sporadic LAM.

We hereby present a case of isolated LAM that showed an unusual aneurysm in the inferior pancreaticoduodenal artery.

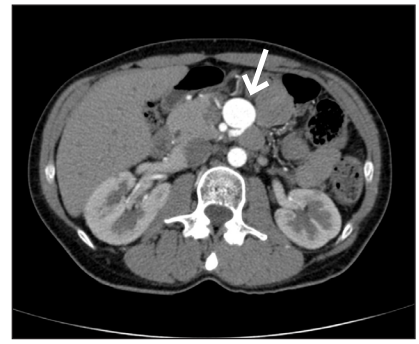

Figure 1. Abdominal computed tomography angiogram demonstrating focal dilation of regular contours of aneurysm (arrow).

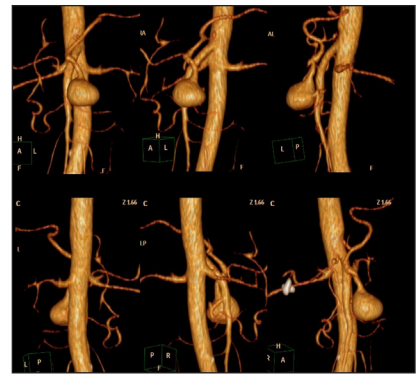

Figure 2. Abdominal computed tomography angiogram of the aneurysm, 2.6 cm in size, in the inferior pancreaticoduodenal artery.

CASE PRESENTATION

Presenting Concerns

A 47-year-old Ecuadorian woman self-referred for a routine visit to her family physician. She had a history of nonsteroidal anti-inflammatory drug allergy, pneumothorax, bilateral pleurodesis, and LAM since 2003 (Table 1). The patient had no respiratory or abdominal symptoms at the time of the visit. Findings of her physical examination were unremarkable. As an annual follow-up, an ultrasonogram had been recommended.

The abdominal ultrasonogram report described "a mass with blood flow in the midabdomen." Consequently, abdominal computed tomography (CT) angiography (Figures 1 and 2) was performed, and results revealed the following: "2.6 cm-sized inferior pancreaticoduodenal artery aneurysm which is being fed by the superior mesenteric artery and celiac circulation. The pancreas appears normal without evidence of

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Table 1. Timeline of case[a]

Year	Summaries from initial and follow-up visits	Diagnostic testing	Interventions
1998	Right pneumothorax	—	—
2000	Right pneumothorax	—	Right pleurodesis
2003	Left pneumothorax	Pulmonary biopsy: LAM	Doxycycline, 100 mg/d; atorvastatin, 20 mg/d; medroxyprogesterone acetate (Depo-Provera), 450 mg/mo
2007	Left pneumothorax	—	Left pleurodesis
2013	Abdominal ultrasonography control and amylase, 126 U/L [RR: 25-125 U/L] 126 U/L, [RR: 25-125 U/L] (2.10 nmol/s·L; RR = 383.33-1416.67 nmol/s L) without symptoms	Ultrasonography: Mass with blood flow in midabdomen. CTA: 2.6-cm inferior pancreaticoduodenal artery aneurysm	Stent graft: (iCAST, Atrium Medical Corp, Hudson, NH) 6 mm × 22 mm and 5 mm × 22 mm Doxycycline, 100 mg/d; atorvastatin, 20 mg/d; clopidogrel, 75 mg/d
2014 and 2016	Stent monitoring	CTA with and without IV contrast agent: Patent stent	Doxycycline, 100 mg/d; atorvastatin, 20 mg/d; clopidogrel, 75 mg/d; medroxyprogesterone acetate, 450 mg/mo
2016 and 2017	Stent monitoring	Ultrasonography: Patent stent	

[a] Personal history of NSAID allergy, bilateral pleurodesis, and laparoscopic cholecystectomy owing to biliary colic; family history of lung cancer and emphysema (father), abdominal aortic aneurysm (uncle), and colon cancer.

CTA = computed tomography angiography; IV = intravenous; LAM = lymphangioleiomyomatosis; NSAID = nonsteroidal anti-inflammatory drug; RR = reference range.

stranding or free fluid." Laboratory findings demonstrated a slightly increased amylase level (126 U/L [reference range: 25-125 U/L] [2.10 nmol/s L; reference range: 383.33-1416.67 nmol/s L]). A diagnosis of arterial aneurysm was made.

Therapeutic Intervention and Treatments

The patient underwent transcatheter arterial embolization, with packing of mechanically detachable coils into the aneurysm, and stent placement. The procedure was tolerated without complications.

Follow-up and Outcomes

Stent monitoring, performed by CT angiography (Figures 3 and 4), and ultrasonograms were normal 4 years after the procedure. She is currently healthy and carries out her activities normally.

DISCUSSION

LAM is a rare progressive disease of unknown etiology; it is characterized by cystic destruction of the lung caused by infiltration of SMCs, and it affects predominantly women typically in their reproductive years (average age at diagnosis = 41 years).[2] Although, the main characteristic is pulmonary cysts, it is common to find (in more than two-thirds of patients) angiomyolipomas, lymphangioleiomyomas, and/or lymphadenopathy in these patients.[7]

The typical pathologic characteristics of LAM are hamartomatous proliferation of immature SMCs in the lymph nodes, lymphatic and blood vessels, and small airways. Primarily LAM affects the lungs and mediastinum.[2] Therefore, the most frequent manifestations are dyspnea on exertion, pneumothorax, and chylous pleural effusion.[1,8] Ansótegui et al[8] have reported that pneumothorax appears in 39% to 81% of patients and recurs in 61% to 81%. Our patient had 3 pneumothoraces, without other symptoms, and a previous diagnosis of LAM. According to Oprescu et al,[9] patients had an average of 2.2 pneumothoraces before the diagnosis of LAM. This is similar to what was found in our patient.

It is known that LAM is associated with TSC in up to 40% of patients.[1,2] An uncommon finding, but which has been reported since 1971, are abdominal aneurysms in patients with TSC. The mean age at diagnosis of abdominal aortic aneurysms in patients with TSC has been 5 years (range = 0.5 months to 24 years).[6] To our knowledge, the patient described in this report is the first patient with a pancreaticoduodenal artery aneurysm associated with LAM. We performed a MEDLINE search to identify reports of abdominal aortic aneurysms associated with LAM, and we did not find related

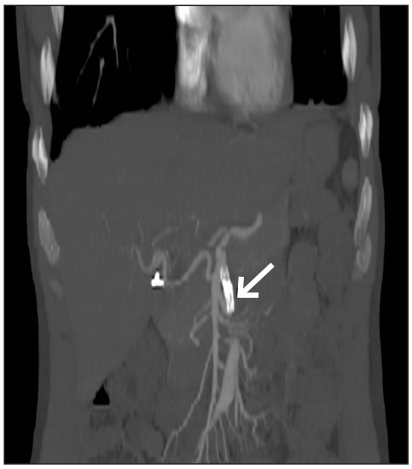

Figure 3. Abdominal computed tomography angiogram performed after the procedure to repair aneurysm, a patent stent appears in the same artery (arrow).

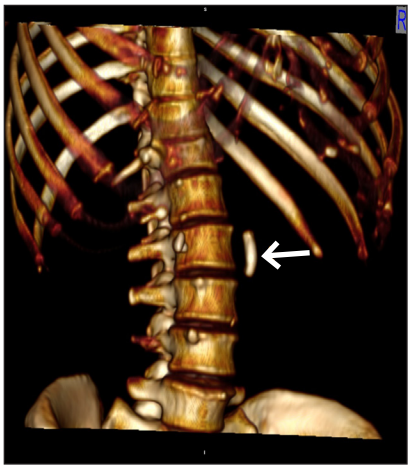

Figure 4. Abdominal computed tomography angiogram after the procedure to repair aneurysm, a patent stent appears in the inferior pancreaticoduodenal artery (arrow).

articles. Abdominal aortic aneurysm has been reported only in TSC.[6,10,11]

The pathogenesis of abdominal aortic aneurysms in LAM is unknown to our knowledge, but in TSC they are likely caused by disorders of the connective tissue[10,11] as a result of deficiency and fragmentation of elastic fibers associated with SMC proliferation[12] and accumulation of mucopolysaccharides in arterial walls.[13] Dysplastic features in addition to medial atrophy and focal medial disruption have been identified; furthermore, secondary intimal fibroplasia was more prominent than adventitial fibrosis, and intimal calcification had been described too.[6] Also, dysplasia and medial atrophy contributes to the loss of aortic wall strength and aneurysm formation.[6] However, all these findings were reported in infants, children, and young adults with TSC.[6,12] In 2010, Cao et al[12] reported an increase of the SMCs in the aortic media in a patient with a thoracoabdominal aneurysm and *TSC2* mutation. Subsequently, they observed in mice that SMCs proliferated faster in the descending aorta than the ascending aorta because of their embryologic origin, a greater number of SMCs in the S/G2/M phase of the cell cycle, and the upregulation of mTOR and other kinases.[12,14-16] All these contributed to the development of aortic aneurysms in mice that had an alteration of the *TSC2* gene.[12]

Currently, in women, patients with chronic pulmonary disease, and tobacco users, abdominal aortic aneurysms are associated with growth and rupture risk[17] (mortality > 80%[18]). Ultrasonography is a reliable method to determine the presence of asymptomatic aortic aneurysms (sensitivity ≥ 95% and specificity approximately 100%)[19] and CT scans or magnetic resonance images have incidental findings of abdominal aneurysms in nearly two-thirds of patients who underwent these tests for other reasons.[18] Abdominal CT or ultrasonography is recommended to evaluate and to follow-up for angiomyolipomas, which are found in about 40% of women with LAM.[20] In our patient, timely screening to support abdominal abnormalities allowed us to detect early abnormalities and to use adequate treatment. The current case represents an atypical abdominal aneurysm in an adult patient with LAM.

CONCLUSION

LAM is a rare lung disease of unknown etiology. Extrapulmonary manifestations include abdominal aneurysm. We reported an unusual inferior pancreaticoduodenal artery aneurysm in a patient with LAM. Therefore, this type of lesion can be added in the search for aneurysms in patients with LAM. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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