Pulmonary Artery Aneurysm as a Clue to Behcet’s Disease in a 7-Year-Old Boy

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Abstract

Pulmonary artery aneurysm is a rare entity with a wide variety of underlying pathophysiological mechanisms. We report a 7-year-old boy who initially presented with suspected Lemierre’s syndrome (tonsillitis and jugular vein thrombosis). However, follow-up imaging studies showed progression of the thromboembolic changes into multiple dural venous structures as well as an aneurysm of the pulmonary artery, without respiratory symptoms. This rare combination of symptoms eventually led to the diagnosis of Behcet’s disease. In this report, we focus on the atypical presentation, the evolution of the clinical and radiological features and discuss the (radiological) clues, which led to the diagnosis.

Keywords: Pulmonary artery aneurysm; Behcet’s disease; Lemierre’s syndrome; Child

Introduction

Pulmonary artery aneurysm (PAA) is a rare entity with a prevalence rate of approximately 1 in 14,000 necropsies [1]. PAA has a wide variety of causes and is generally classified into a mycotic aneurysm, which arises from a bacterial infection and is previously described in patients with endocarditis, patent ductus arteriosus and its secondary interventional treatment, or non-mycotic aneurysms which in turn are associated with a variety of diseases such as Behcet’s disease, connective tissue disorders, Hughes-Stovin syndrome, trauma, and pulmonary hypertension [2]. These two different types of aneurysms are difficult to distinguish from each other exclusively using imaging studies. However, distinguishing these different entities is important to prevent any delay in diagnosis and treatment. Both mycotic and non-mycotic PAA may be complicated by acute rupture, causing hemoptysis and uncontrollable bleeding. This is obviously associated with a high mortality rate [1, 2]. Urgent appropriate treatment of suspected PAA is recommended and usually consists of (partial) lobectomy or pneumonectomy [1, 2]. Although interventional treatment options are improving, they are technically not always possible to perform, for example due to the location of the aneurysm [2].

Behcet’s disease, a relatively frequent cause of non-mycotic PAA, is a chronic relapsing immune-mediated vasculitis [3, 4]. Behcet vasculitis is distinguished by the involvement of both venous as well as arterial vessels [4]. It is a systemic disease in which almost all organs may be involved, causing a wide variety of symptoms. Clinically, Behcet’s disease is characterized by the presence of oral ulcers in 95-100% of cases [3]. Other common symptoms are uveitis and genital ulcers. The diagnosis is based on clinical criteria, established by the International Study Group for Behcet’s disease, and a positive pathergy test, which is pustule formation 24 - 48 h after skin injury [3]. Histologic findings are usually non-specific. PAAs in Behcet’s disease are caused by inflammation of the vasa vasorum, which destruct the elastic fibers, resulting in dilatation of the vessel. PAA in Behcet’s disease is a well-known cause of morbidity and mortality [3, 5].

Case Report

We report the case of a 7-year-old boy of African descent with no remarkable previous medical history, who initially presented at a general hospital with tonsillitis for which he received amoxicillin. During antibiotic treatment however, fever persisted and he developed diplopia and amblyopia due to a nervus abducens paresis. Reassessment of the referral imaging studies showed opacification of bilateral mastoid processes and thrombosis of the proximal right jugular vein with thrombus extension into the right sigmoid and transverse sinus up to the confluens sinuum. The sagittal superior and left sigmoid sinuses and transverse sinuses were open. Based on this imaging
study, the diagnosis of Lemierre’s syndrome was made, antibiot-
ic treatment consisting of ceftriaxone and clindamycin was
started and he was referred to a university medical center for
further evaluation and multidisciplinary treatment.

A mastoidectomy on the right side was performed in our
patient by the ENT surgeon and antibiotic treatment was con-
tinued with clindamycin. Ceftriaxone was switched to merop-
emen extending the spectrum of antibiotic coverage to Pseu-
domonas aeruginosa and anaerobe growing microorganisms
because of persisting fever and suspected infectious thrombo-
sis. However, high-grade fever persisted and neck stiffness ap-
peared. Therefore, magnetic resonance imaging (MRI) of the
brain was repeated which revealed progressive extension of
thrombosis into the sinus sagitallis superior and the left trans-
verse, sigmoid and sphenoparietal sinus (Fig. 1). No paren-
chymal injury or leptomeningeal enhancement was seen. Low
molecular-weight heparin was started in therapeutic doses,
measured by anti-Xa activity because of progressive throm-
bosis. Extensive analysis of coagulation pathways revealed no
prothrombotic hematologic disorder.

Although multiple blood samples were taken for blood
culture, we never isolated Fusobacterium necrophorum or any
other microorganism. The first blood culture was taken after
antibiotic treatment was already started, and the patient con-
tinued antibiotic treatment for suspected Lemierre’s syndrome.
Remarkably, follow-up studies revealed progression of the si-
inus thrombosis, despite adequate antibiotic and anticoagula-
tion therapy. A partial thrombectomy was performed by the
intervention radiologist, after which a slight decrease of sinus
thrombosis was seen. After thrombectomy, the MRI showed
stabilization of the thrombosis in size and location.

Because of persisting fever and progressive thrombosis
under antibiotic and anticoagulative treatment, additional
workup was performed including a thorax radiograph, bone

Figure 1. Magnetic resonance imaging of the brain, transverse (a) and sagittal (b) T1-weighted post-contrast. Both images show
extensive thrombosis of the transverse sinus on both sides (arrows) and confluens sinuum (arrowhead).

Figure 2. Contrast-enhanced CT of the thorax: (a) the initial size of the pulmonary artery aneurysm (diameter 1.1 cm), (b) the size
of the aneurysm 1 month later (diameter 2.9 cm), also appreciate increase of the mural thrombus.
scintigraphy, PET-CT scan, ultrasound of the abdomen, MRI of the brain, thorax and abdomen, which did not reveal any abnormalities, especially no abscesses, which could have been most likely expected in Lemierre’s syndrome.

One month after thrombectomy by catheterization, an ultrasound of the abdomen was performed because of abdominal pain, which revealed thrombosis of the right external and common iliac vein. This vein was used to perform the thrombectomy. On MRI, thrombosis of the right iliac vein was confirmed, extending to the infrarenal inferior vena cava. The left femoral vein showed normal flow voids. No evidence of local abscess was seen. This finding was considered to be contagious spread of infected thrombus during the interventional procedure. We also found a hyperintense lesion of the right lower lobe of the lung, which showed enhancement after contrast. Clinically, no pulmonary symptoms were noted. A subsequent CT scan showed opacification defects of the segmental branches of the right lower lobe matching multiple pulmonary emboli. Distal to a pulmonary embolus of the segmental branch of the dorsal basal segment of the right lower lobe, an aneurysmatic widening of the pulmonary artery was seen, which was partially filled with mural thrombus (Fig. 2a). The maximal diameter was 1.1 cm. This finding was considered to be a mycotic aneurysm due to septic emboli in a patient with Lemierre’s syndrome. The left lung did not show any pulmonary emboli. There were no parenchymal abnormalities of the lungs, especially no cavitations or abscesses. Echocardiography did not reveal any abnormalities.

Follow-up studies showed a progression in size of the aneurysm with a maximum diameter of 2.9 cm (Fig. 2b). Furthermore, new thrombosis of the left jugular vein, left brachiocephalic vein and superior vena cava was found, localized at the position of a central venous catheter. Induration of the surrounding fat of the left jugular vein was seen, which was considered a thrombophlebitis component in Lemierre’s syndrome. Follow-up studies, after removing the catheter, showed decreased size of the thrombosis, also the thrombosis of the femoral vein and inferior cava vein eventually decreased in size.

Endovascular techniques are preferentially used to manage PAA but considered impossible in this patient due to the peripheral location of the aneurysm. Therefore an indication for pulmonary lobectomy was set and the patient was referred to a university medical center for pediatric cardiothoracic interventions. The patient was transferred 3 months after initial presentation in the general hospital.

Post-operative histological examination of the resected lung tissue revealed an aneurysm of the pulmonary artery with destruction of the vessel wall and degradation of the lamina elastic interna and externa (Fig. 3). Furthermore, thrombus formation with an inflammatory infiltrate of macrophages, lymphocytes, plasma cells and neutrophilic granulocytes was present. Occasionally iron could be found. No eosinophils or giant cells were observed.

Based on the clinical history, imaging findings and pathological findings, the final diagnosis of Behcet’s disease was made. Anti-inflammatory treatment was started, consisting of pulses with high-dose corticosteroids followed by oral treatment with prednisolone and monthly cyclophosphamide. Currently, 1 year after initial presentation, the patient is doing well with low dose prednisolone and followed up by the pediatric rheumatologist.

Discussion

Initially, in our patient Lemierre’s syndrome was highly suspected considering the classical sequentiation of tonsillitis followed by thrombosis of the jugular vein and extensive sinus thrombosis. Lemierre’s syndrome is a suppurative thrombophlebitis of the jugular vein, which is frequently preceded by pharyngitis mostly with tonsillar or peritonsillar involvement. In extensive form, the infection may spread, causing systemic dissemination of septic emboli. The most frequently causative microorganism is Fusobacterium necrophorum [6].

However, there were several remarkable features, which made us reconsider this diagnosis. Firstly, no Fusobacterium necrophorum or any other microorganism was found in multiple cultures. Initially, these negative cultures were attributed to the fact that all cultures were taken after antibiotic treatment had already been started. Secondly, a hypercoagulable state persisted

Figure 3. Elastica van Gieson stain of (a) pulmonary artery aneurysm (between arrows) with thrombus (T) (× 12 magnification; scale bar = 1,000 µm) and (b) pulmonary artery and inflammatory infiltrate (× 50 magnification; scale bar = 500 µm). There are (1) destruction of lamina elastica of vessel wall and (2) inflammatory infiltrate consisting of macrophages and neutrophilic granulocytes (T: thrombus; B: bronchus; C: cartilage).
Behcet’s disease is a difficult diagnosis. Early recognition of Behcet’s disease is important because regression of a PAA in Behcet’s disease is possible after corticosteroid or additive immunosuppressive treatment [3, 4]. In our case, early recognition and appropriate treatment might have prevented the invasive treatment that this patient eventually received.

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**References**