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Case Report

Unusual cause of septic pulmonary emboli: Infected iliac aneurysm with suppurative thrombophlebitis

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ABSTRACT

Septic pulmonary emboli are usually associated with an infected source of venous circulation such as IV drug use, indwelling catheters, right-sided infective endocarditis, liver abscess or Lemierre's syndrome. However, there are no case reports of septic pulmonary emboli caused by infected arterial aneurysms. We present a case of septic pulmonary emboli caused by an infected iliac arterial aneurysm complicated with suppurative thrombophlebitis of the inferior vena cava due to Klebsiella pneumoniae. A 77-year-old man visited our emergency department complaining of fever and back pain with septic shock. Contrast-enhanced computed tomography revealed a saccular right iliac artery aneurysm with surrounding soft tissue inflammation, suppurative thrombophlebitis in the inferior vena cava, and septic pulmonary emboli with blood cultures positive for Klebsiella pneumoniae. Endovascular aortic repair for the infected iliac arterial aneurysm with long-term antimicrobial treatment was performed without any recurrence or complications. An infected iliac arterial aneurysm can cause septic pulmonary emboli if its infection progresses to the adjacent vein wall and is complicated with suppurative thrombophlebitis. Since early diagnosis, prompt antimicrobial therapy and removal of the infected sources are essential to treat septic pulmonary emboli, we should investigate vein thrombosis and suppurative thrombophlebitis near the infected arterial aneurysm in the absence of usual causes of septic pulmonary emboli in venous circulation.

1. Introduction

Septic pulmonary emboli (SPE) are rare but serious disorder and are usually complicated with an infected source of venous circulation such as IV drug use, indwelling catheters, infective endocarditis of the tricuspid valve, liver abscess or Lemierre's syndrome [1]. However, there are no case reports of SPE caused by infected arterial aneurysms. We present a case of SPE caused by an infected iliac arterial aneurysm complicated with suppurative thrombophlebitis of the inferior vena cava due to *Klebsiella pneumoniae*.

2. Case description

A 77-year-old man visited our emergency department complaining of fever and back pain. He had a previous history of myocardial infarction and aortic valve replacement but no history of IV drug use or an indwelling catheter. On physical examination, body temperature was 39.0 °C, blood pressure was 90/43 mmHg, heart rate was 143 beats per minute, respiratory rate was 40 times per minute and oxygen saturation was 89%. In laboratory tests, white blood cell count was 7000/μL, platelet count was 10,800/μL and C-reactive protein was 34.5 mg/dL. Contrast-enhanced computed tomography (CT) revealed a saccular right iliac artery aneurysm with surrounding soft tissue inflammation (Fig. 1-A) and SPE (Fig. 1-B). Liver abscess, Lemierre's syndrome and pulmonary arteriovenous shunt were not detected by CT. According to these findings, we made a diagnosis of septic shock due to an infected iliac arterial aneurysm and started treatment with intravenous meropenem and vancomycin. Three days after admission, *Klebsiella pneumoniae* was detected in blood cultures, so we changed the antibiotic to cefmetazole referring to the drug sensitivity. Repeated transthoracic echocardiography revealed no signs of infective endocarditis and patent foramen ovale. But chest CT findings of SPE three days after admission had become worse. So, we reexamined the first CT in more detail and found an adjacent vein thrombosis in the inferior vena cava proximal to the infected iliac arterial aneurysm in the first CT (Fig. 1-C). Finally, we made a diagnosis of venous thrombosis in the inferior vena cava that developed due to infection of an iliac arterial aneurysm and progressed to suppurative thrombophlebitis, resulting in SPE. Four

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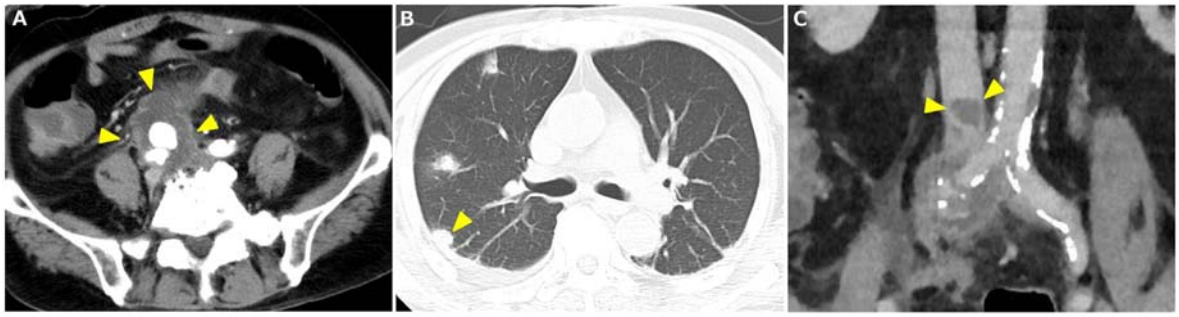

Fig. 1. CT revealed a saccular right iliac arterial aneurysm with surrounding soft tissue inflammation (A). CT revealed multiple nodular opacities peripherally indicating septic pulmonary emboli (B). Sagittal CT showed thrombosis in the inferior vena cava proximal to the infected iliac arterial aneurysm (C).

days after admission, we performed endovascular aortic repair (EVAR) for the infected iliac arterial aneurysm to control the infectious source and to prevent arterial rupture, and continued antimicrobial treatment for 8 weeks without recurrence of a positive blood culture or aneurysm rupture. We did not use anticoagulation because of the risk of aneurysm rupture. Laboratory findings and CT findings improved gradually and the patient was discharged to home on the 53rd hospital day.

3. Discussion

SPE caused by an infected source of arterial circulation such as an infected iliac arterial aneurysm is extremely rare. However, if its infection progresses to the adjacent vein wall and is complicated with suppurative thrombophlebitis, infected emboli might flow into the pulmonary circulation and lead to SPE.

SPE are rare but serious disease that is difficult to recognize. An embolic blood clot containing microorganisms from an infected source leads to an infarction in the pulmonary vasculature. It was reported that a chest CT revealed multiple nodular opacities peripherally due to an embolic infectious blood clot [2]. The most common causative pathogens are staphylococcal species associated with IV drug use, indwelling catheters, infective endocarditis, and *Fusobacterium* associated with Lemierre's syndrome [3]. SPE complicated with a liver abscess is often caused by *Klebsiella pneumoniae* as in our case [4]. However, there are no case reports of SPE caused by infected arterial aneurysms. This case is the first reported case of SPE caused by an infected iliac arterial aneurysm.

The pathogenesis of our case might be similar to that of jugular vein suppurative thrombophlebitis known as Lemierre's syndrome, which is preceded by infection of a tonsil or peritonsillar involvement. Infectious involvement of the jugular vein wall progresses to suppurative thrombophlebitis of the jugular vein that leads to metastatic infection such as SPE [5]. In our case, the primary source of infection was an infected iliac arterial aneurysm with *Klebsiella pneumoniae*. Despite the effectiveness of antimicrobial treatment for *Klebsiella pneumoniae*, chest CT findings of SPE became worse during the first 3 days. Therefore, we reexamined the first CT images, and we noticed an adjacent venous thrombosis of the inferior vena cava proximal to the infected iliac arterial aneurysm. We finally made a diagnosis of venous thrombosis of the inferior vena cava that developed due to infection of an iliac arterial aneurysm and progressed to suppurative thrombophlebitis, resulting in SPE, as in Lemierre's syndrome. The mechanism of this uncommon occurrence could be thought in two ways: contiguous spread of *Klebsiella* infection and bacteremia seed secondary to thrombus formation. In the follow-up CT findings on the 8 month, a saccular right iliac artery aneurysm with surrounding soft tissue inflammation was clearly disappeared and the border between iliac artery and IVC was well-circumscribed, so we hypothesized that contiguous inflammation/vascular endothelial damage to the IVC + a hypercoagulable state have predisposed to thrombus formation that was seeded during Klebsiella bacteremia [6]. Based on these hypotheses, we planned to perform long-term intravenous antimicrobial treatment performed EVAR to control the source of infection. EVAR was reported to be effective against infected aneurysm in patients with hemodynamically unstable patient [7]. It can be performed minimally invasive and can reduce the risk of rupture of infected aneurysm. Our patient was under septic state, so we judged to perform EVAR and then no recurrence was observed during 8 month after discharge.

SPE are usually associated with an infected source of venous circulation. However, if an infected arterial aneurysm is found in a patient with SPE, vein thrombosis and suppurative thrombophlebitis near the infected arterial aneurysm should be investigated. Since surgical intervention might be needed, long-term antimicrobial treatment or anticoagulation should be performed to treat suppurative thrombophlebitis and SPE.

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Declaration of Competing Interest

None declared.

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