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Case report

Delftia acidovorans: A rare cause of septic pulmonary embolism from catheter-related infection: Case report and literature review

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ABSTRACT

Septic pulmonary emboli is a rare condition due to the dislodgement of an infected thrombus traveling to the pulmonary vasculature via the venous system. Staphylococcus spp. and Candida spp. are the most common causative agents. The most common risk factor is intravenous drug abuse, but there has been an association with intravenous catheters. Delftia acidovorans (DA) is a rare organism causing catheter-related infection, which has a tendency to embolize and clog up major vessels. It is highly resistant to all available aminoglycoside agents. There are only a few cases reported in children showing DA as a cause of septic emboli with none of the cases reported in a young patient. We report a similar case but in a young adult who developed septic emboli due to DA that was caused by an infected peripherally inserted central catheter (PICC) line. Since the organism is highly susceptible to recurrent embolization, the PICC line was removed and the patient was treated successfully with an appropriate antibiotic regime.

1. Introduction

Septic pulmonary embolism (SPE) is an uncommon phenomenon caused by dislodgement of an infected thrombus which travels in the venous system and ends up in the lungs. Common risk factors for SPE include intravenous drug abuse, indwelling plastic catheters, burns, infective endocarditis of the tricuspid valve, septic thrombophlebitis, suppurative angina, periodontal abscess, skin and soft tissue infections, pelvic thrombophlebitis, liver abscess, and systemic corticosteroid use [1]. Infective endocarditis has been most commonly involved as an etiology for SPE, with infected IV catheters being a more recent topic of interest [2]. Staphylococcus spp, and Candida spp. are the most common pathogens of septic emboli, however, enteric bacteria have been uncommonly found to be pathogenic [3]. Septic emboli can present with nonspecific symptoms, such as fever, cough, shortness of breath, but can quickly deteriorate into life-threatening complications such as pulmonary embolism, pneumonia, endocarditis, shock, pneumonia, and splenic infarction if not treated aggressively [4]. Patients at high risk should be evaluated with a transesophageal echocardiogram (TEE) to rule out any vegetations. These patients require critical attention to imaging studies and immediate treatment to delay further complications. Here we present a case report of catheter-induced septic emboli with a rare organism, Delftia acidovorans (DA).

2. Case presentation

A 49-year-old female with a past medical history of intravenous drug abuse and a recently diagnosed vertebral osteomyelitis on intravenous antibiotics via peripheral inserted central catheter (PICC) line was admitted to the hospital with intractable nausea, vomiting, abdominal pain, and worsening shortness of breath for the past two weeks. She denied having a fever or chills. On admission, the patient was afebrile, blood pressure (BP) was 106/84 mm Hg, pulse was 110 beats/min, and respiratory rate was 21 breaths per minute. She was saturating at 95% on 3 liters (L) of oxygen therapy and her physical examination revealed decreased breath sounds bilateral, diffuse abdominal tenderness and visible track marks along both arms. Cardiovascular examination was normal with no audible heart murmurs. Laboratory tests at the time of admission were unremarkable except for normocytic normochromic anemia with hemoglobin and hematocrit of 8.0 g/dL and 24.2%, respectively and an elevated C-reactive protein of 3.6. Electrocardiogram (ECG) on admission revealed sinus rhythm with a normal axis. Computed tomography (CT) scan of the chest showed multiple pulmonary nodules in bilateral lung fields; the largest one measuring 1.7 cm in the right lower lobe and 1.5 cm in the left lung. There were also bilateral pleural effusions present. CT scan abdomen without contrast did not show any acute abdominal

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Table 1
Delftia Acidovorans and line related sepsis in adults.

Reference	Year	Age, years	Infection	Risk factors	Treatment	Successful outcome
Lair MI et al.	1996	27	CRBSI	AIDS due to chemotherapy for NK cell lymphoma	Catheter removal, IV imipenem, and amikacin	yes
Lang KJ et al.	2011	65	CRBSI	Hematologic malignancy	Catheter removal and IV imipenem	Yes
Present case	2019	49	CRBSI	Intravenous drug abuse	Catheter removal, IV piperacillin-tazobactam	yes

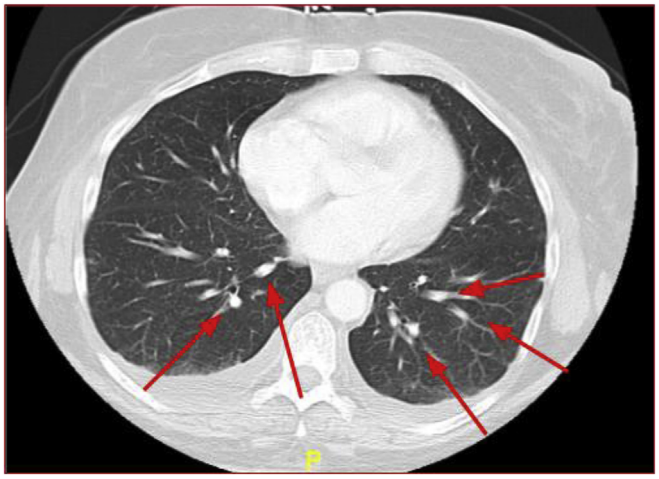

Fig. 1. Pulmonary Septic Emboli seen on CT Chest.

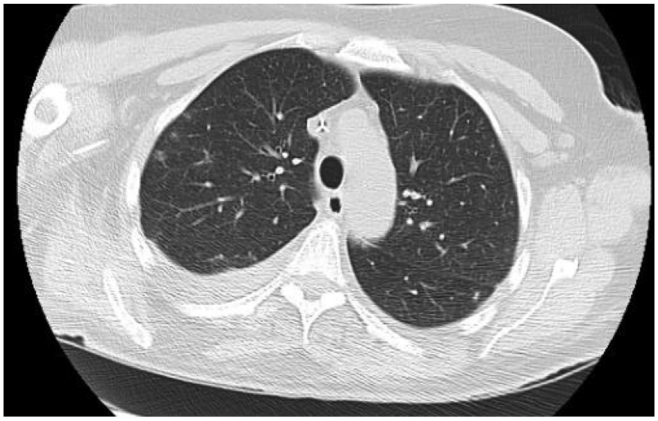

Fig. 2. Process of resolving Septic pulmonary emboli a month later after treatment with antibiotics.

pathology. A transthoracic echocardiogram was performed on day 8 which revealed mild tricuspid regurgitation with an elevated right ventricular systolic pressure of 49 mm Hg, and a stress test which did not reveal any ischemic changes. Due to a high suspicion of infective endocarditis, a TEE was done which showed a filamentous echogenic structure consistent with a vegetation, seen on the tip of PICC line. The tricuspid valve was free of vegetation. Other findings included normal left ventricular size and systolic function, with an ejection fraction of 55%, and no left ventricular wall abnormalities. Two sets of aerobic blood cultures grew out Delftia acidovorans which was resistant to aminoglycosides but sensitive to piperacillin-tazobactam. The patient was started on IV piperacillin-tazobactam and the PICC line was removed on day 8. After a few days of starting the patient on this management, the patient showed significant clinical improvement. She completed six weeks course of IV piperacillin-tazobactam in the hospital and was discharged to the rehabilitation facility. She was readmitted a month later for a different issue, and her chest CT showed significant improvement.

3. Discussion

Delftia acidovorans, previously known as Comamonas acidovorans, is a non-fermentative, saprophyte organism mainly found in soil and water. It is a ubiquitous gram-negative, aerobic rod that is usually not pathogenic. In immunocompromised individuals, this pathogen has been known to cause infective endocarditis, ocular infections, otitis media, peritonitis, urinary tract infections, empyema, and nosocomial bacteremia, including central venous catheter-related bacteremia [5]. There have been four reported cases of catheter-associated DA bacteremia, two in the adult population and two in the pediatric population. In 1996, Lair MI et al. reported the first case of catheter-related DA bacteremia in adults suffering from Acquired Immune Deficiency Syndrome (AIDS) [6]. Another case of central line-related DA bacteremia was reported in 2011 [7]. Similar to our case, both of these patients faced a favorable outcome after the removal of the catheter and treatment with antibiotics. Ender PT et al. reported an isolated case which was treated without catheter removal in a pediatric patient [8]. Our patient had a complication of SPE breaking off from the vegetation of the intravenous catheter in the absence of cardiac valvular vegetation. SPE due to DA without the presence of cardiac vegetations has not been previously documented in the literature.

SPE presents with non-specific manifestations including fever, dyspnea, pleuritic chest pain, and cough [9]. The diagnosis of SPE is a combination of clinical signs and symptoms along with radiologic findings that include focal or multifocal lung infiltrates, presence of an active extra-pulmonary source of infection as a potential embolic source, exclusion of other potential explanation for lung infiltrates and resolution of lung infiltrates with an appropriate antibiotic regimen [2]. Specific radiographic features of SPE typically include patchy air space lesions, multiple ill-defined round or wedge-shaped densities of varying sizes from 0.5 to 3.5 cm located in the peripheral lung field; and bilateral rapid progression of cavities or abscess formations [10]. CT chest will reveal bilateral pulmonary nodules with or without cavitary lesions [11]. As mentioned above, the CT chest of our patient showed multiple nodules in both lungs, reinforcing the diagnosis. The most common organism causing SPE in intravenous drug users is *Staphylococcus aureus*, which is about 40% of cases [12]. In our case, the TEE showed vegetations on the patient's PICC line, which was the source of SPE. Instead of the commonly associated organisms, blood cultures grew DA sensitive to piperacillin-tazobactam and resistant to aminoglycosides. DA is known to be resistant to aminoglycosides, as was the same in our case [7]. Commonly, DA is susceptible to extended-spectrum cephalosporins, piperacillin, trimethoprim-sulfamethoxazole, fluoroquinolones, and tetracyclines [13]. While phenotypically similar to Comamonas acidovorans, the differentiation is made on the basis of aminoglycoside susceptibility. Comamonas is sensitive to aminoglycosides while DA is resistant. A couple of case reports illustrate infective endocarditis caused by DA in intravenous drug users [13,14]. However, in our case, DA caused vegetations on the catheter with no evidence of any effect on the cardiac valves in a severely immunocompromised patient with suspected intravenous drug abuse.

In conclusion, DA related catheter infections should be considered a serious source of infection in intravenous drug users, which can lead to a serious, but rare complication of SPE. A better understanding of the etiology and sources of SPE will establish the diagnosis and management of this potentially fatal condition more promptly. This requires an

urgent evaluation of the catheter and treatment with broad-spectrum antibiotics, besides aminoglycosides to prevent dire complications such as SPE (see Table 1, Figs. 1 and 2).

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