

Implantable cardioverter defibrillator endocarditis caused by *Klebsiella pneumoniae* complicated by liver abscess and septic pulmonary embolism

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ABSTRACT

A 63-year old diabetic male patient carrying an implantable cardioverter defibrillator (ICD) was hospitalized with a 7-day history of fever, notwithstanding an antibiotic therapy. The white-blood cell count was 11,000/mm³, the platelet count was 135,000/mm³ and C-reactive protein (CRP) 13 mg/dL. Chest X-rays showed right infiltrates. Ceftriaxone was started. Defervescence was rapid, but CRP was still 12 mg/dL after 6 days. A trans-thoracic echocardiogram (TTE) incidentally showed a liver hypoechoic lesion. A computed tomography scan revealed bilateral cavitated lung nodules and a large liver abscess. *Klebsiella pneumoniae* was isolated in blood cultures and TTE showed ICD endocarditis and a patent *foramen ovale*. Levofloxacin and imipenem/cilastatin were started. The liver abscess was drained. After 30 days, the ICD was removed and re-implanted. At discharge, blood tests were within the normal range and the patient was asymptomatic. Follow up showed improvement of lung and hepatic lesions. To our knowledge, this is the second reported case of *K. pneumoniae* infective endocarditis with multiple septic emboli. Endocarditis should be suspected in presence of fever after the device implantation, in particular if risk factors are present.

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Introduction

Implantation of cardiac devices is nowadays a routine procedure in cardiovascular medicine.¹ Cardiac device endocarditis (CDE) has emerged as a serious complication of electrotherapy with a reported incidence between 0.06% and 7%.^{2,3} *Staphylococcus epidermidis* and *Staphylococcus aureus* are the etiological agents in 70% to 90% cases of CDE and have been extensively studied in the past, while non-staphylococcal organisms have been reported only in case reports or small series.⁴ In particular, Gram negative bacteria are infrequent etiological agents of cardiovascular implantable electronic device infections.¹ *Klebsiella pneumoniae* endocarditis is a rare entity with a reported poor prognosis and high mortality.⁵ Rivero *et al.* reported the first case of liver abscess caused by *K. pneumoniae* associated with infective endocarditis.⁶

Case Report

We report the case of a 63-years old man, who was admitted to our hospital with a 7-day history of fever, notwithstanding an empiric antibiotic therapy (amoxicillin/clavulanate 1 g *bis in die per os*). The patient had a history of diabetes mellitus, hypertension and was a carrier of an implantable cardioverter dual-chamber defibrillator (ICD) for a ventricular fibrillation episode. At admission, his vital signs were as follows: temperature 38.4°C, heart rate 80 beats/min, blood pressure

145/80 mmHg and oxygen saturation 97% in room air. Wheezes were present at chest auscultation; the abdomen was soft, with no significant tenderness, hepatomegaly was reported. The rest of the exam was unremarkable. White-blood cell count was 11,000/mm³ and platelet count was 135,000/mm³ with C-reactive protein (CRP) at 13 mg/dL (normal range <0.50 mg/dL). Liver function tests were normal, the urine analysis was unremarkable. His chest X-rays revealed right lobar infiltrates. Intravenous ceftriaxone 2 g was started as empiric antibiotic therapy for community-acquired pneumonia. Blood cultures were collected and a trans-thoracic echocardiogram (TTE) was planned, in order to exclude endocarditis. The patient presented rapid defervescence, but remained asthenic; moreover CRP was 12 mg/dL after 6 days of antibiotic therapy. The patient underwent a TTE, which incidentally showed a 9-cm liver hypoechoic lesion. A thoracic/abdominal computed tomography (CT) scan revealed multiple bilateral nodular opacities in the lungs with peripheral cavitations that were consistent with septic emboli and a large abscess in the left lobe of the liver (7×9×10 cm) (Figures 1 and 2). No other radiological findings consistent with chronic lung disease or interstitial pneumonia were revealed. Blood cultures were positive for extended spectrum β -lactamase, negative for *K. pneumoniae*, therefore intravenous levofloxacin 750 mg/die and imipenem/cilastatin 500/500 mg *quater in die* were started. The patient underwent the TEE, which showed a thickened ICD tip, strongly suggestive of electrocatheter endocarditis, and patent *foramen ovalis* (PFO) (Figure 3). Antibiotic therapy was maintained and the liver abscess was treated with percutaneous drainage. According to international guidelines,⁷ after 30 days of antimicrobial therapy, the ICD was re-

moved in a specialized center (*Spedali Civili di Brescia*) and re-implanted. At discharge, the blood test was within the normal range and the patient was asymptomatic. Radiological follow up showed improvement of lung and hepatic lesions.

Discussion and Conclusions

To our knowledge, this is the second reported case of *K. pneumoniae* liver abscess with multiple septic emboli associated with infective endocarditis.



Figure 2. Abscess in the left lobe of the liver by computed tomography scan (7×9×10 cm).

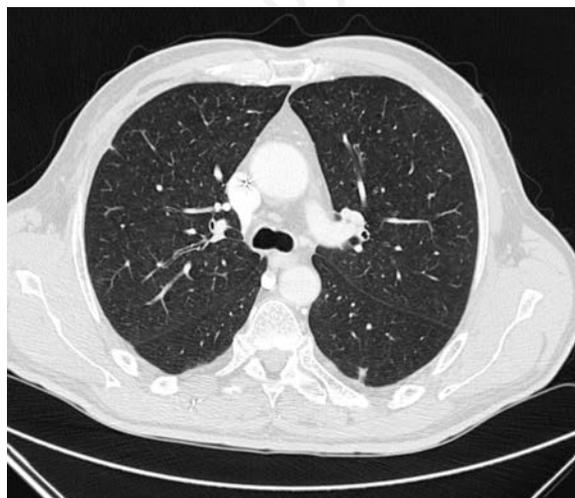


Figure 1. Multiple bilateral nodular opacities in the lungs with peripheral cavitations consistent with septic emboli (computed tomography scan).

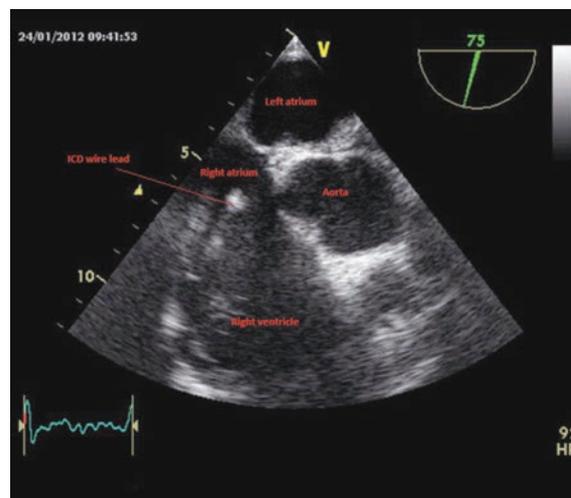


Figure 3. Trans-thoracic echocardiogram shows thickened implantable cardioverter defibrillator catheter strongly suggestive of electrocatheter endocarditis.

Gram negative (including *K. pneumoniae*) infective endocarditis is rare (5% of cases). The aortic valve is the most common involved site. The urinary tract infections and pacemaker infections are the most common source of bacteremia reported in the literature.⁵ In the 1990s *K. pneumoniae* emerged as the leading etiological agent of community-acquired pyogenic liver abscess in East Asia.⁸ Several cases of *K. pneumoniae* liver abscesses have been recently reported outside Asia.⁹⁻¹¹ In large case series of *K. pneumoniae* liver abscesses, between 40 and 78% of patients were affected by diabetes mellitus or impaired glucose tolerance.⁸ Retrospective studies on cardiac device-related endocarditis reported several risk factors for developing CDE, which in all cases included diabetes mellitus.¹² Besides fever, signs of CDE are signs of inflammation in the area surrounding the implanted cardiac device, leukocytosis, anemia and pulmonary emboli (asymptomatic in 40% of patients), if right heart endocarditis is present. Our patient was hospitalized for fever of unknown origin. The first findings were lung lobar infiltrates in the chest X-rays, which appeared as metastatic emboli only in the CT scan, performed when the liver abscess was diagnosed. No radiological findings consistent with chronic lung disease or interstitial pneumonia were found, leading us to assume that lungs were not the primary source of infection. The initial event was probably an ICD endocarditis with septic metastatic events in the liver and in the lungs through the PFO. The source of bacteremia could have been a urinary tract infection, as previously reported.¹³ Literature data show a significant delay between the onset and the diagnosis of device-related endocarditis (mean 5.5 months).¹² Therefore, diagnosis of CDE should always be suspected in presence of fever after cardiac device insertion. Blood cultures and echocardiography should always be performed.

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