



Abdominal sepsis caused by *Enterobacter ludwigii* in a 72-year-old patient on chronic hemodialysis, with lack of vascular accesses, complicated by cholecystitis and with non-occlusive thrombosis of the superior vena cava and right atrium

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ABSTRACT

Infections are very common complications among patients on chronic hemodialysis. Hemodialysis patients with a catheter have a 2- to 3-fold increased risk of hospitalization for infection and death compared with patients with an arteriovenous fistula or graft. The most common causative pathogens are gram-positive bacteria, according to several studies, *Staphylococcus aureus* and coagulase-negative staphylococci accounting for 40% to 80% of Catheter-related bloodstream infections (CRBSIs). Gram-negative organisms cause 20% to 40% CRBSIs, whereas polymicrobial infections (10%-20%) and fungal infections (<5%) are less common. Abdominal infections are not common in hemodialysis patients. Other complications, such as the loss of the vascular access many times imply immediate threat to the patient's life. In most severe cases of infections, it requires removal of the catheter. When the source is abdominal, *E. coli* followed by *Bacteroides* spp are involved. We present the evolution and treatment of a 72-year-old woman, on chronic hemodialysis, with an exhaustion of most of vascular accesses, who suffers a sepsis with initial suspicion of a catheter infection. Subsequent studies revealed a biliary infection secondary to *Enterobacter ludwigii*. The patients additionally complicates with a non-occlusive thrombosis of the superior vena cava and right atrium.

Keywords

Sepsis, Dialysis, Catheter

Introduction

The most common source of sepsis in chronic hemodialysis patient is the catheter infection,

followed by the pulmonary, urinary, cutaneous and gastrointestinal tract [1-3]. Biliary sepsis is not common. Catheter-related bloodstream

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infections (CRBSIs), exit-site infections, and tunnel infections are common complications related to hemodialysis central venous catheter use. According to several studies [4,5]. Catheter-related bloodstream infections (BSIs) alone have a reported incidence of 1.1 to 5.5 episodes per 1000 catheter days and are associated with increased morbidity, hospitalization, and death. Metastatic infectious complications of CRBSIs include endocarditis, osteomyelitis, spinal epidural abscess, septic arthritis, brain abscess, and septic pulmonary emboli so it's very important to detect the infection on time and treat it properly.

The most common organisms are *Staphylococcus aureus* and coagulase negative *Staphylococcus*, usually well handled with antibiotic treatment. Only in most severe cases the removal of the catheter is inevitable, also in case of *S. aureus* an echocardiogram must be done. According to different series, the incidence of endocarditis secondary to this organism varies between 1.7 and 6.2 cases per 100.000 habitants in USA only [6]. When the sepsis is secondary to an abdominal infection, usually *E. coli* is involved, and it is more common in Peritoneal dialysis patients rather than in hemodialysis, nonetheless, some of those patients have left some residual diuresis, in that case, infections by *E. coli* are more common. A sepsis secondary to a biliary infection is not common at all in dialysis patient, unless there is a background of some major abdominal surgery. The exhaustion of all vascular access is a major problem in nephrology and one of the most important causes of death in this population together with cardiological disease followed by infections [7].

Clinical Case

A 72-year-old patient, from Bulgaria with the next background: no allergies, type 2 diabetes of 7 years of evolution, chronic ischemic heart disease with no atrial fibrillation, chronic kidney disease (CKD) G5D secondary to tubulointerstitial nephritis, on a chronic hemodialysis program. Several failed arteriovenous fistulas with loss of most of vascular accesses, having the dialysis throughout a right central jugular venous catheter. In 2010 she presented an ischemic colitis in sigma that required surgical treatment. A stage IIA gastric adenocarcinoma in 2015, (pT3N0M0) Operated through laparoscopic total gastrectomy and reconstruction of intestinal transit.

She was admitted to Nephrology July 2017 for episode of hypotension during dialysis, fever and thrombocytopenia. Given the suspicion of sepsis by tunneled catheter, blood cultures were made, and antibiotic therapy was started with vancomycin and later with tobramycin and levofloxacin. In the first 48 hours, the clinical state got worsen presenting leukocytosis with neutrophilia as well as an increase of C-reactive protein 256 mg/l and procalcitonin of 100 ng/dl. In this context, the antibiotic coverage with meropenem was started suspending the rest of the antibiotics and transferring the patient to the Intensive Care Unit (ICU). The poor clinical state of the patient persisted, so despite having exhausted the rest of the venous accesses, it was decided to withdraw the permanent tunneled catheter. Subsequently, a temporary femoral catheter was placed under echography guide with great difficulty to continue with hemodialysis. The patient presented abdominal pain with defense in the right hypochondrium with a positive Murphy's sign. The abdominal ultrasound confirmed the presence of an acute cholecystitis and simultaneously the result of the blood cultures previously extracted reported an *Enterobacter ludwigii*. Given these findings, daptomycin was associated, and an urgent percutaneous cholecystectomy was made, improving clinical state of the patient. Subsequently, endoscopic retrograde cholangiopancreatography (ERCP) was requested but it was not possible to perform, cause of a difficult access to the biliary tract due to the previous gastric surgery. The drainage culture was positive for *Bacteroides vulgatus*, associating metronidazole to the previous treatment. As a complication, the patient presented a non-occlusive thrombosis of superior vena cava and right atrium; it was managed with removal of the central venous catheter and anticoagulating with heparin. After completing the antibiotic treatment and negative blood cultures the patient was discharged.

Discussion

In comparison with the general population, sepsis in patients with chronic hemodialysis has a higher mortality. Recent studies showed an increasing role of Gram-negative bacilli (BGN) in bacteremia in this group of patients. In catheter sepsis, colonization of the connections is the key in the etiopathogenesis of these infections. Although the recommended access in hemodialysis is fistula, numerous centers maintain an important number of catheters as access for

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hemodialysis (aging population, diabetic, long waiting list in vascular surgery). The pathogenesis of the infection is multifactorial. The main access route is the endoluminal colonization of the catheter. The microorganisms that are most frequently involved are *Staphylococcus aureus* and coagulase negative staphylococci. In gastrointestinal infections, *Enterobacter* species present resistance to ampicillin, amoxicillin and cephalosporin. This implies a careful choice of antibiotic treatment when treating a patient with several active foci. The loss of vascular access in hemodialysis patients is one of the most feared complications reported. The three main types of access are: native arteriovenous fistula (AVF), arteriovenous graft, and central venous catheter (CVC). It accounts for considerable morbidity and mortality with an estimated annual cost of close to one billion United States dollars. In some cases, an underlying coagulopathy might be found. It must be considered as a possible complication in an advanced age patients with several risk factors such as diabetes, chronic kidney disease, bedridden patients for long period of time etc. Atrial fibrillation (AF) is one of the most common sources of thrombi formation, although this was not our case, nonetheless several studies reported a stress-activated c-Jun N-terminal kinase (JNK) signaling contributes to AF development [8-10]. Moreover, this factor

also might be involved in a chronic pathological stress and the thrombosis-promoting conditions and thrombosis formation.

In this particular case, the advanced age of the patient, the chronic kidney disease, the recently operated gastric adenocarcinoma plus a considerable time of hospitalization might contribute to a thrombi formation. Other factors like Hypercoagulability, diabetes, hypovolemia, hypotension or external compression might be involved in these non-stenotic thrombotic events. In this case, a femoral temporal catheter was placed and a heparin perfusion was started solving the problem [11]. Unfortunately catheters infections are common, even with the best care. Moreover, the guidelines recommend having at least 70% of fistulas and 30% or less catheters in dialysis units, however this recommendation is very hard to achieve, therefore, and to decrease to a minimum, catheters related complications, those patients must be monitored closely [12]. In the particular case of infections, mostly are caused by Gram-positive bacilli, other microorganisms involved and sepsis source must be ruled out. Several factors as previous surgeries or other underlying condition must be taken into account, especially in patients with a single and often the last venous access for dialysis.

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