End-Stage Renal Patient Treated by ECMO and SLED in Legionnaires’ Disease

Cristina Cândido1, Nuno André Sousa2 Ana Martins1, Borja Moya1, Philip Fortuna1 and Luis Bento1
1Centro Hospital de Setúbal - São Bernardo Hospital, Nephrology, Setúbal, Portugal
2Hospital de Leiria, Internal Medicine, Leiria, Portugal
3Central Lisbon Hospital Centre - Curry Cabral Hospital, Multipurpose Intensive Care Unit, Lisbon, Portugal

Abstract

Legionnaires’ disease is an important cause of community-acquired pneumonia. Although uncommon, disease outbreaks of public health significance still happen nowadays. Several outbreaks have been occurred in various European countries but the most recent one occurred in Portugal. It was one of the largest of the world and began in November 2014 in Lisbon. We know that mortality might be higher in people who have pre-existing medical conditions. The chronic kidney disease population is predisposed to adverse infectious events but it’s not considered up to this moment a main risk factor of bad prognostic to the Legionella infection. The authors present a case report of a sporadic smoker young patient with chronic kidney disease who had a catastrophic presentation of Legionella pneumophila infection requiring simultaneous use of two extracorporeal techniques.

Keywords: Chronic kidney disease; Disease outbreaks; Extracorporeal membrane oxygenation; Legionella; Sustained low-efficiency dialysis

Introduction

Legionnaires’ disease (LD) may be a severe systemic illness caused by an aerobic gram negative bacillus, Legionella pneumophila (LP), involving multiple organs, principally in the respiratory tract. The global incidence of LD is therefore difficult to quantify. Data from studies in Europe suggest that 2–5% of cases of community-acquired pneumonia are actually LD, which is around ten times higher than reports received through even the best national surveillance systems [1,2]. Most cases occur in older people and predominantly in men [3-9]. Although most cases of LD occur sporadically, clusters warranting investigation and point source outbreaks can occur, sometimes with substantial implications for public health. Any source of aerosol generation has the potential to transmit Legionella spp [10,11]. In the outbreak occurred in November 2014 in Vila Franca de Xira, Lisbon, Portugal, one of the world’s largest – 375 cases, it was found that the strain of bacteria isolated from a cooling tower in a local factory was the same strain that was identified in the bronchial secretions of patients. The recent major outbreaks emphasize the need for further research to support early diagnosis and improve clinical or outbreak management [12,13].

The main risk factors for acquiring LD are smoking, older age, chronic cardiovascular or respiratory disease, diabetes, alcohol misuse, cancer (especially profound monocytopenia as seen in hairy cell leukaemia), and immunosuppression [14-17]. No known risk factors identified in some cases (28% in a recently published series) [18]. The chronic kidney disease (CKD) population is predisposed to adverse infectious events but it’s not considered up to this moment a main risk factor or a bad prognostic to the Legionella infection [19,20].

Generically, the mortality rate of 8–12% is typical, but some studies have shown that this rate can change according to different populations [20]. Some advances regarding secondary complications due to these infections have been made including extracorporeal membrane oxygenation (ECMO). This is an extracorporeal circuit intended to oxygenate blood and remove carbon dioxide, ensuring a systemic perfusion of oxygenated blood as a rescue therapy in patients already ventilated under protective ventilation strategy [21]. Although this technique exists since 1971, the latest advances in technology have improved the risk-benefit profile [22]. It is available in Portugal since 2009.

The ECMO is indicated for acute respiratory failure associated with severe ARDS and pneumonia non-responsive to recruitment manoeuvres. According to data from 2013 Extracorporeal Life Support Organization (ELSO) conference, the number of patients undergoing ECMO for respiratory failure was 3761 with an ECMO survival rate of 64% and a survival rate of 55% at discharge [23–25]. The complications of this technique relates mainly to the risk of anticoagulation-induced bleeding. The failure of the oxygenator and thrombus formation are other common complications [26]. The association with other extracorporeal techniques is scarce in the literature.

Case Report

The authors present a 31 years old male patient resident in Vila Franca de Xira, smoker (4 pack units year), with stage 5 chronic kidney disease (CKD) of unknown etiology, admitted in a multi-purpose intensive Care Unit (ICU) with the diagnosis of hypoxic pneumonia to LP serogroup 1 (positive antigenuria). In the initial assessment, the patient underwent thorax computed axial tomography that highlighted a number of areas of consolidation and bilateral ground glass opacities translating a pneumonic process (Figure 1). The thoracic echocardiography didn’t highlight any signs of fluid overload. Antibiotherapy with levofloxacin and azithromycin was maintained, while conventional hemodialysis (cHD) was started due to important nitrogen product didn’t highlight any signs of fluid overload. Antibiotherapy with levofloxacin and azithromycin was maintained, while conventional hemodialysis (cHD) was started due to important nitrogen product accumulation. In a few hours, the patient became refractory to conventional invasive ventilation and was chosen for ECMO with maintenance of...
protective ventilation. The patient was maintained in conventional dialysis. On the 4th day of ECMO some objective signals of the water overcharge were verified. It was necessary to switch cHD to Sustained Low-Efficiency Dialysis (SLED) thus maintaining two techniques of extracorporeal circulation simultaneously for 7 hours a day. The use of vasopressor wasn’t necessary. A gradual clinical improvement was registered, which led to the suspension of the ECMO technique at day 7. At day 8 he was extubated and was also able to tolerate cHD.

Discussion

Although many people are exposed to *Legionella spp.*, very few develop Legionnaires’ disease and in many cases no known risk factor is identified. This suggests that there is still much to discover in LD. The identification of high mortality risk groups could increase practitioner awareness and contribute to its reduction. Specifically, prospective LD studies, comparing different severity of illness scores, practitioner awareness and contribute to its reduction. Specifically, prospective LD studies, comparing different severity of illness scores, practitioner awareness and contribute to its reduction. Specifically, prospective LD studies, comparing different severity of illness scores, practitioner awareness and contribute to its reduction. Specifically, prospective LD studies, comparing different severity of illness scores, practitioner awareness and contribute to its reduction. 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