First successful treatment of Legionella pneumonia in patient with hemoblastosis in Kazakhstan: A case report

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Abstract

A 55 years old woman with multiple myeloma was referred to us for autologous hematopoietic stem cell transplantation. The patient developed Legionella pneumonia while mobilization of hematopoietic stem cells.we report a case of successful treatment Legionella pneumonia in patient with multiple myeloma.

Introduction

The first epidemic outbreak of Legionella pneumonia was recorded in 1976 in Philadelphia (USA), when 4400 congress participants of the American Legion veteran organization 221 (5%) developed severe pneumonia, 34 (15.4%) of them died. Six month later J.E. McDade and C.C. Shepard could have isolated the pathogen from lung tissue of deceased patients, it was called Legionella pneumophila in memory of the first victims (1). Legionella pneumophila is in the top of 3 most frequent causes of community-acquired pneumonia and associated with high morbidity, as shown by the high proportion of patients requiring intensive care unit (ICU) admission (2-4).

The genus Legionella forms a genetically related taxonomic structure, while the Legionellaceae family consists of only one genus and belongs to the g-subtype of proteobacteria. Legionella are gram-negative rods 0.5–0.7 μm in diameter and 2–5 μm in length (5).

Legionella pneumonia lack diagnostic specifity. Warm season, age over 40, male sex, smoking, presence of concomitant diseases, accompanied by a course of systemic hormonal and / or intensive immunosuppressive therapy are defined as the risk factors that have been associated with severity of legionella pneumonia (5). Legionella pneumonia is often misdiagnosed, that leads to under treatment of legionella accounted community acquired pneumonia (6). Mortality rate ranges from 8 to 40 %, in cases of legionella pneumonia admitted to the ICU mortality was around 33%, duration of symptoms before ICU admission longer than 5 days, and intubation were reported to be associated with increased mortality (7). Early initiation of appropriate therapy decreases the mortality rate to less than 5 %. Delay in initiation of appropriate antibiotics is associated with a worse prognosis (8). Diagnosis is based mainly on the isolation of the pathogen from sputum, bronchoalveolar lavage fluid, pleural fluid, and occasionally from blood cultures. L pneumophila serotype 1 accounts for about 90% of all Legionella pneumonia. Widespread use of rapid methods for the determination of soluble antigen of L. pneumophila serotype 1 in urine have led in recent years to a tangible decrease in mortality in this disease. The method allows to confirm the diagnosis within 1-2 hours. This method has advantages over others due to non-invasiveness and timing (9).

We present a case of clinical manifestation of legionellesis in immunocompromised patient with multiple myeloma.

Case presentation

A 55 years old woman with multiple myeloma. She has been treated with six cycles of VCD (bortezomib/cyclophosphamide dexamethasone) scheme chemotherapy. After 6 cycles she had no major toxic events and achieved partial response according to the uniform response criteria of the International Multiple Myeloma Working Group (IMWG). She was proposed for autologous hematopoietic stem cell transplantation, that was performed in our center.

On admission was WBC 5.8x10^9/l, C-reactive protein 5.22 mg/l (normal range below 5.0). Mobilization of hematopoietic stem cells started on November 8-th 2019. The patient tolerated well the administration of drugs and remained clinically stable. The first count of CD 34 was planned on November 18-th 2019. On10-th day after hematopoietic stem cell mobilization initiation patient condition worsened. Patient was transferred to intensive care unit for further treatment. On admission to ICU body temperature 40°C, SpO2 - 88-90% without oxygen, with oxygenation was 96-97%, respiratory rate is 30-35/minute, hemodynamically stable, leucocyte count 15.1x10^9/hemoglobin 97 g/l, platelet-34 x $10^{3/}$mkl, C-reactive protein 404.45 mg/l (normal range below 5.0). Antibacterial therapy (cefepim 2.0g), noninvasive mechanical ventilation (CIPAP, FiO 35 %, Vt-450 ml PEEP-5. Pasb-12 every 3-4 hours for 1 hour) and High Flow therapy (FiO2- 50-60%,40-50l/min) was initiated.

Chest computed tomography (CT) showed bilateral pneumonia, bilateral exudative pleuritis, multiple foci of chest bone destruction (myeloma disease). In comparison with CT study dated 31.10.2019 increase in infiltration in the lower lobe of the left lung and the development of bilateral pleuritis. (Figure 1)

Patient condition showed no improvement, body temperature was 38-39° C, leucocyte count 14.9 x10^9/l C-reactive protein 417.78 mg/l. Additional therapy: cefepim was changed to alpitoz 4.5g, antifungal (Kansidas 50 mg). Despite the therapy patient's condition kept on worsening (Table 1). Based on clinical manifestation of unknown pneumonia, it was decided to make an express test for Legionellesis I serotype in urine (BinaxNOW Legionella Control Swab Pack, Manufacturer: Alere Inc., USA), the result was positive L pneumophila serogroup 1. Moxifloxacin 400 mg was added to the therapy. Following day, the patient's respiratory status gradually improved, body temperature, the breath rate (22-26) C reactive protein normalization was detected (Table 1). Respiratory support High Flow therapy and CIPAP were also discontinued on the fourth day of moxifloxacin treatment. Saturation was 98 % without oxygen therapy.

Discussion

Immunocompromised patients, especially those receiving cytotoxic chemotherapy are at higher risk for developing Legionella pneumonia (10). Our case showed that delay in diagnosis verification led to worsened patient's condition due to respiratory failure. Only after pathogen verification in the urine, appropriate therapy was prescribed. We believe that in the treatment of patients with immunodeficiency and signs of pneumonia, it is imperative to actively use the available methods of express diagnosis of Legionella pneumophila. That can reduce the mortality rate to 0-5.5%. This case shows that the diagnosis is very important, but also with an unusual clinical manifestation of pneumonia, legionella should be considered in the differential diagnosis in immunocompromised patients.

Conflict of interest

The authors declare that they have no competing interests.

Acknowledgement

We thank the patient for allowing us to share the details of treatment in this paper.

Author's contribution

Merenkov Y. - constructed the idea of manuscript; planned the methodology; collected data; wrote the manuscript.

Saparbay J. - wrote the manuscript;edited the manuscript.

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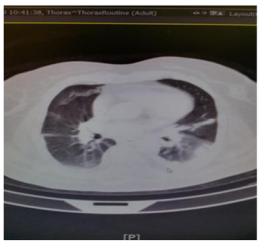
Figure legends

Figure 1.

CT signs of bilateral pneumonia, bilateral exudative pleurisy, multiple foci of chest bone destruction (myeloma)

Table 1

Blood tests and treatment scheme outcome and follow-up



	1-st day	2-nd day	3-rd day	4-th day	5-th day	6-th day	7-th day	8-th day	9-th day	10-th day
BODY TEMPERATURE	**40**	**38,4**	**38,3**	**39,1**	**37,8**	**36,9**	**35,9**	**36,4**	**35,9**	**36,1**
RESPIRATORY RATE	**40**	**36**	**38**	**35**	**30**	**28**	**24**	**22**	**22**	**18**
WBC	**15,1**	**18,7**	**14,9**	**6,5**	**7,4**	**4,7**	**4,8**	**4,3**	**6,2**	**6,5**
CRP	**404**	**332**	**417**	**312**	**328**	**180**	**82**	**52**	**30**	**21**
PROCALCITONIN		**1,79**		**1,69**						
CEFEPIM	+	+								
PIPERCALLIN-TAZOBACTAM			+	+	+	+	+	+	+	+
KANSIDAS			+	+	+	+	+	+	+	+
MOXIFLOXACIN				+	+	+	+	+	+	+
OXYGENOTHERAPY							+	+	+	+
CIPAP		+	+	+	+	+				
HIGH-FLOW		+	+	+	+	+				