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Lower Respiratory Tract Infection due to *Lophomonas blattarum*: A Report of Two Cases and a Review

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Abstract

Here, we describe two cases of *Lophomonas blattarum* bronchopulmonary infection. The first patient was diagnosed for long years with chronic lymphocytic leukemia and was stable all through his course. The second patient was an immunocompetent patient. Both patients presented within a month for admission with a non-resolving lower respiratory tract infection, they received several antimicrobials as an outpatient and initially as inpatients without benefit. Broncho-Alveolar Lavage (BAL) revealed the causative parasite on the fluids wet mount examination. Both improve remarkably on metronidazole treatment and were discharged home. Around two weeks after discharge from the hospital, both patients were in good health with no fever and respiratory symptoms of bronchopneumonia.

Keywords: *Lophomonas blattarum*; Bronchopulmonary infection; Lung parasitic infection; Immunodeficient patients; Immunocompetent patients; Cockroaches

Introduction

In *Lophomonas blattarum* is a unicellular flagellated parasite, its natural habitats are termites and cockroaches (*Periplaneta Americana*, *Blattella germanica*, *Blatta oreintalis*), and it multiplies in the gut of the insects and is excreted as cysts to the environment. Cyst inhalation is the responsible route for the infection causing lower respiratory tract infections and sinusitis [1,2]. *Lophomonas blattarum* is a sporadic cause of Community-Acquired Pneumonia (CAP) and it is rarely diagnosed. However, it causes bronchopulmonary disease in both the immunocompromised and immunocompetent patients [3,4]. Hitherto, an unusual microorganism causing CAP should always be in mind, especially when a patient has a refractory history, appropriate previous antimicrobial treatment, and his duration of illness do not match a straightforward case of viral or bacterial pneumonia in adults and pediatric patients, moreover, it was suggested that the closer presence of infected insects in the human environment, the higher the risk of acquiring the infection [3,5]. To our knowledge, those are the first reported cases from Jordan and the Arab countries of *Lophomonas blattarum* causing bronchopulmonary infections in two patients; an immunocompetent and an immunocompromised patient with a stable chronic lymphocytic leukemia CLL.

Case Presentation

Case 1

An 80-year-old male patient with a stable CLL for the last few years, he was admitted in early March 2022 to Al Khalidi Hospital, Amman, Jordan, with the complaint of fever for 3 weeks before admission, in the last week it was high-grade up to 40˚C and was associated with progressive breathlessness on minimal exercise. Two days before his hospital admission, the patient complained of progressive dry cough and right mid-lateral chest pains exacerbated by breathing. Recently, the patient traveled to Dubai and stayed around two weeks with his family, did not eat exotic food, did not deal with pets or animals, and had no allergies. At home, he was prescribed parenteral Meropenem for a week. On admission, he did not appear acutely sick, his pulse rate was 109 beats/min, blood pressure 128/78 mmHg, respiratory rate 22 breaths/min, and temperature 38.8˚C. Chest examination showed bilateral basilar crackles, mostly were more on the right lateral side of the chest. C-RP 260 mg/L, ESR 75 mm, Hgb 162 gm/l, WBC 92.192K, Neutrophils 33%, Lymphocytes 64%, Platelets 527, Procalcitonin 0.232, D-Dimer 0.62 mic/ml, SARS-COV-2 by PCR was negative, serum Galactomannan index was 3.123 on admission (16/3/2022), it was repeated on the next day and was 0.2, buffy Coat no inclusions bodies were seen, blood, urine, and pleural fluid Cultures were sterile, pleural fluid cell count and differential revealed the following; Leucocytes 110×10^6, Erythrocytes 240×10^6, Neutrophils 35%, Lymphocytes 65%. Pleural fluid wet mount staining was negative. Pleural fluid analysis was glucose 116.00 mg/dl, Albumin 1.70 g/dl, Total protein 2.9 gm/dl, and Lactate dehydrogenase 884.0 U/L. KOH preparation, AFB stain, and Ziehl-Nielsen stain were negative. Respiratory panel PCR was a borderline positive *Legionella pneumophila*. A peripheral blood smear showed no acute leukemic transformation and no evidence of parasites. O_2 Sat at the beginning of the infection was recorded at home at 97%, and on hospital presentation, it was 89%. Chest CT showed right basal bronchopulmonary disease and bilateral mild emphysematous lung changes (Figure 1A). Fiberoptic bronchoscopy revealed no significant changes, and Bronchoalveolar Lavage (BAL) fluid gram-stain showed no bacteria, fluid regular cultures and one-

week incubation did not grow microorganisms, AFB stain did not reveal acid-fast bacilli, and six weeks later Loewen-Janstein culture media for tuberculosis did not grow *M. tuberculosis*. The cytological examination was negative for malignant cells. A BAL fluid wet mount slide showed an oval trophozoite of *Lophomonas blattarum* (Figure 1B). He developed pleural effusion, it was Gram-stained and cultured, AFB-stained and cultured, with a fluid wet mount examination and a cytological examination, all were negative. During the first few days before the diagnosis of *Lophomonas blattarum*, he was started on parenteral Ceftriaxone and Moxifloxacin with no improvement. The day the patient was diagnosed with *Lophomonas blattarum*, parenteral metronidazole 500 mg every 6 hours was started. All other antimicrobials were discontinued. He showed a steady improvement in the patient's condition and was discharged in good condition. During his hospital stay, he was evaluated by his hematologist with no additional intervention as the patient was known to him for years, he has been having a stable CLL course thus far. Ten days later after his discharge from the hospital, he was well, with no fever, and his repeat chest X-Ray showed residual atelectasis in the right lower lung lobe.

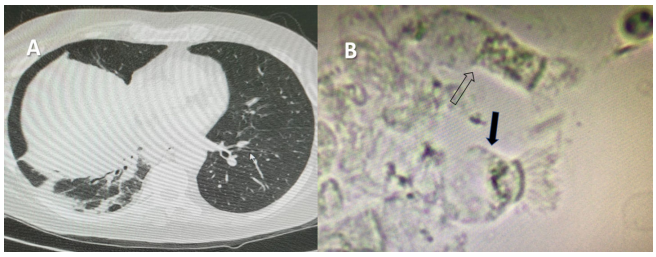

Figure 1: (A) Chest CT findings of the CLL patient demonstrating the right Basal infiltrate, a pattern described as a bronchopulmonary disease. (B) The BAL fluid of the CLL patient demonstrates *Lophomonas blattarum* (solid arrow), note: that the cytoplasm is granular with big particles (food phagocytosis), and the nucleus appears as a dark structure next to the flagella. An adjacent bronchial ciliated cell for comparison (open arrow). Wet mount, light microscopy magnification X 400.

Case 2

A thirty-three-year-old female dentist is known to have a migraine headache, otherwise, she was medically free. She was well until 22 days before her hospital admission in late March 2022. At first, as an outpatient, she was seen by several physicians and was diagnosed with an influenza-like illness on repeated visits. Later she presented with non-resolving pneumonia, and she was prescribed several antibacterial and steroids without a tangible benefit. Her symptoms were progressively worsening with right lower thoracic pain, dry cough, night sweats, shortness of breath which increased on deep breathing for 12 days, and arthralgia, but no fever, chills, or rigors. She was not a smoker, had no known allergies, no travel, did not eat exotic food, did not deal with pets or animals, and she did not sleep out. On admission, her BP was 115/60 mmHg, Temperature 36.9˚C, breathing rate 21/min, O_2 Sat 91. There was crepitation in the right lateral lower chest but no other findings were detected. On admission, she received parenteral antibiotics without improvement. Her blood cultures did not grow microorganisms, urine Legionella antigen was negative, and Qiagen (20) respiratory panel was negative. Her complete blood count, kidney and liver blood tests were normal, D-Dimer was 0.42 ug/ml, galactomannan index 0.26. Pleural fluid aspiration analysis was transudate, and no bacteria or fungi were seen or cultured. Doppler ultrasound demonstrated no lower limbs deep venous thrombosis. Initial CT chest showed lower right Lung wedge infiltrate suspected to be pulmonary embolism (Figure 2A), a pulmonary CT angiogram did not demonstrate embolism but showed increasing right lower lobe infiltrate compared with the previous chest CT (Figure 2B). Bronchoscopy did not reveal an endobronchial abnormality, fluids were tested for gram stain, AFB stains, regular and tuberculosis cultures, and cytological examination, all were normal. A wet mount of the BAL fluid examined under light microscopy demonstrated a pear-shaped unicellular organism with actively moving apical flagella identified as *Lophomonasblattarum* (Video.https://youtube.com/shorts/ifWVTvkunjk?feature=share). The previous antimicrobials were discontinued and metronidazole was started at 500 mg IV every 6 hours, with a rapid clinical improvement. She was discharged home on oral metronidazole with subsiding symptoms. She was re-evaluated as an outpatient; her pain and CXR continue to improve.

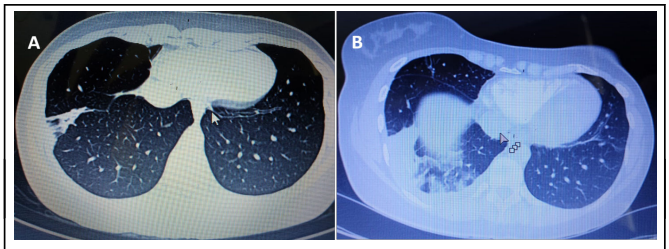

Figure 2: (A) In the second immunocompetent patient, a chest CT scan demonstrated a right-side wedge-shaped pleural-based infiltrate, and (B) a chest CT angiography did not confirm a pulmonary embolism but increasing infiltrate.

Results and Discussion

In 1993, the first case of *Lophomonas blattarum* bronchopulmonary disease was reported from China and it was followed by many other reports from the southern China mainland [6,7]. Subsequently, many reports followed from a few parts of the world, namely Turkey, Peru, Spain, Iran, India, Malaysia, Mexico, and Panama, [5,8-14]. Still, *Lophomonas blattarum* remains rarely reported as a cause of upper and lower respiratory tracts infections [1,15], possibly due to its uncommon sporadic occurrences, or it may have been frequently missed due to low suspicion as a cause of pneumonia, hence, the infrequent wet-mount examination of the BAL respiratory fluids, and almost the lack of utilization of the molecular approach and electron microscopy [16-18]. The radiological examination may assist to some extent in suspecting an unusual pathogen causing pulmonary infection when an unexpected clinical scenario finding is associated with an unmatched radiological finding, like migratory pneumonia, occasional unexpected bronchiectasis, pulmonary abscess, and hydrothorax not well-matched with the extent of the infiltrate seen on the chest CT [19]. Both, of the currently reported patients, had pleural effusions more than what was expected from the extent of the radiological findings they had. However, reasonable clinical support to suspect the diagnosis of an uncommon pathogen causing bronchopulmonary disease is a group of patients with high treatment-resistant respiratory infections, this may draw the attention to unusual pathogens including *Lophomonas blattarum* Infection [20]. Besides, physicians should not focus on using sequential and combination antibacterials in an attempt to elicit a clinical response, rather, initiating a proper workup like BAL fluid for a routine examination, in addition, a wet mount

examination may reveal Lophomonas or other potential reasons for the "treatment-resistant cases" [21,22].

In the current two patients, the first patient received home parenteral antimicrobials for a few days, in addition to the oral ones to "normalize temperature" as soon as possible without a meticulous evaluation, while the second patient received several antibacterials despite the absence of response, but repeated prescription of antibacterials was continually trying to attain a clinical response trying to ameliorate cough and to normalize her chest x-ray.

Conclusion

In conclusion, and up to our knowledge, *Lophomonas blattarum* is reported for the first time in Jordan, and other Arab countries. A high index of suspicion should always be kept in mind seeking an unusual microorganism as the causative agent of community-acquired pneumonia. A wet mount examination of the BAL fluids should be requested when an unfamiliar clinical presentation and a lack of response occur in a patient under recommended antimicrobials treatment, and a delay in clinical response would be an eye opener.

Ethical Approval

No ethical issues for the manuscript.

Conflict of Interest

All authors have no conflict of interest for the manuscript.

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