

## CASE REPORT

# First report of emerged pulmonary lophomoniasis in two Afghanian medical tourists

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## Abstract

*Lophomonas* is a neglected and emerging protozoan that infects the lower and upper respiratory tracts of humans. Here, we present two cases of lophomoniasis from Afghanistan that include symptoms such as fever, cough, hemoptysis, and pleural effusion.

## KEYWORDS

Afghanistan, *Lophomonas*, lophomoniasis, respiratory

## 1 | INTRODUCTION

The *Lophomonas* parasite is a flagellated extracellular protozoon that belongs to the Hypermastigida order and sub-order Lophomonadina. *Lophomonas* protozoa are mostly found as endocommensals in the genus of cockroaches, such as *Periplaneta americana* (American cockroaches) and *Blattella germanica* (German cockroaches).<sup>1</sup> The parasite may infect a number of tissues and organs, but clinically, the respiratory tract is the most commonly infected tissue.<sup>2,3</sup> Generally, *Lophomonas* infection causes symptoms (cough, sputum, and shortness of breath) in the respiratory tract.<sup>4-6</sup> It is difficult to distinguish this infection from other common lung infections with

similar symptoms, such as pneumonia, bronchitis, or inflammation.<sup>7</sup>

*Lophomonas* parasites have been detected in samples collected from both upper and lower respiratory systems, mostly in bronchoalveolar lavage (BAL) fluid, followed by sputum.<sup>7</sup> Currently, microscopic examination is routinely used to detect the parasite using a light microscope, but recently, a specific polymerase chain reaction (PCR) test has been developed to confirm and identify these mysterious protozoa. In 1993, China reported the first case of pulmonary *Lophomonas* infection. Due to the unknown life cycle of the enigmatic parasite, lophomoniasis infection has not been considered by scientists in other countries.<sup>8</sup>

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Recently, however, the possible cycle of *Lophomonas* has been described by Fakhar et al. They described parasitic cysts as an infectious form and cockroaches, dust mites, and termites as reservoirs of infection. Therefore, inhalation of air/dust contaminated with parasitic cysts is the most probable and acceptable mode of transmission. It can cause infections in various tissues and organs, including the sinuses, lungs, and other parts of the respiratory tracts.<sup>7</sup>

Most cases have been reported from Asian countries, but several cases of human infections have been reported from other countries in the world.<sup>7</sup> So far, there is no evidence of lophomoniasis cases from Afghanistan, western Asia. Thus, here we report two cases of pulmonary lophomoniasis from Afghanistan.

## 2 | CASE PRESENTATION

### 2.1 | Case 1

In this case, a 15-year-old boy of Afghan nationality, as a medical tourist with no history of previous illness, was referred to Shariati Hospital in the Iranian capital following symptoms of shortness of breath, low-grade fever, chronic productive cough, and pleuritic pain and was admitted to the hospital's emergency department. On examination, the patient's vital signs were as follows: Blood pressure (BP): 110/80 mmHg, respiratory rate (RR): 30 breaths/min, heart rate (HR): 129 beats/min, oxygen saturation (Spo<sub>2</sub>): 90%, and temperature (T): 37.6°C. Blood samples were also taken for the routine laboratory tests. The computed tomography (CT) scan findings showed bronchitis in the right upper lobe.

On physical examination, the patient's abdomen was soft and no signs of tenderness or organomegaly were reported in the liver and spleen. The results of laboratory tests on the patient were normal. The patient was nominated for "fiber-optic" bronchoscopy due to the recurrence of respiratory symptoms and frequent coughs. Two BAL samples separately were subjected to the Iranian national registry center for lophomoniasis (INRCL), Mazandaran University of Medical Sciences, and hospital laboratory to rule out (R/O) lophomoniasis, tuberculosis (smear and PCR), and possible fungal infection, respectively. The results of mycological tests did not confirm any fungal infection.

The BAL sample for BK (Bacillus of Koch) was also negative for both smear and PCR. After preparation of a wet smear from a BAL sample, the live and active *Lophomonas* trophozoite was identified using a light microscope (Figure 1). The BAL sample was also proved by a small subunit ribosomal RNA (SSU rRNA) PCR test.<sup>9</sup> Thus, the



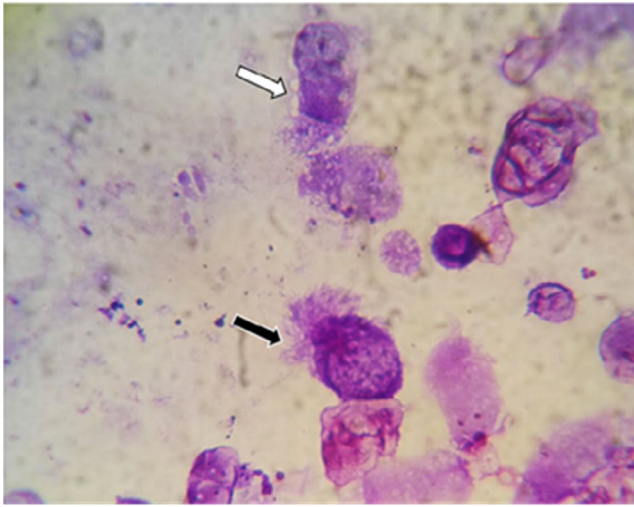
**FIGURE 1** Wet smear prepared from broncho alveolar lavage (BAL) specimen showing mobile and live *Lophomonas* trophozoite (head of arrow). (400×)

*Lophomonas* infection was confirmed. Based on the above laboratory evidence, the patient was eventually treated with oral metronidazole (500 mg/TDS; 2 weeks) to treat lophomoniasis. He was discharged in good general condition from the hospital.

### 2.2 | Case 2

In this case, a 55-year-old woman from Afghanistan, as a medical tourist, complained of dyspnea, hemoptysis, low-grade fever, and chronic productive cough with a history of high-dose antibiotic therapy in the emergency room of Shariati Hospital, Tehran, the Capital of Iran. She arrived at the hospital with vital signs (BP: 110/70 mmHg, HR: 88 beats/min, RR: 22 breaths/min, and T: 37.7°C). Respiratory sounds in the lungs and laboratory tests on the patient were normal. The CT scan findings showed nodular infiltration in the right upper lobe and segmental pneumonia in the left upper lobe. After receiving infectious consulting, the patient was admitted to the infectious ward of the hospital, and during this period, she underwent antibiotic therapy.

After 1 week, the patient was nominated for bronchoscopy due to a persistent cough and chest pain. Two BAL samples were separately sent to the INRCL at Mazandaran University of Medical Sciences for the diagnosis of pulmonary lophomoniasis and another sample to the tuberculosis reference laboratory in Tehran. The obtained laboratory findings were as follows: *Lophomonas* trophozoites were observed in the wet smear prepared from the patient's BAL sample and also stained with the Giemsa staining method to identify morphological details (Figure 2). The presence of *Lophomonas* infection was also confirmed by the SSU rRNA PCR test.<sup>9</sup> The BAL sample for BK was also negative for both smear and PCR.



**FIGURE 2** Photomicrograph showing a *Lophomonas* trophozoite (black arrow) and a bronchial epithelial cell (white arrow)

### 3 | DISCUSSION

Examination of the clinical and laboratory findings and imaging of these two patients showed that their clinical and laboratory patterns are consistent with our previous patients in the INRC. Also, although the imaging findings in lophomoniasis patients are non-specific, based on our recent experiences, unexplained radiological findings in the lungs, rule-out of malignancies, as well as response to metronidazole treatment, and resolving of the observed lesions are adequate to justify the pathological findings in the lungs of the patients.<sup>7</sup>

Furthermore, because the clinical symptoms of lophomoniasis, including chronic cough, dyspnea, and hemoptysis, are similar to those of other infectious diseases, such as tuberculosis and invasive aspergillosis, it should be added to the list of diseases to be ruled out.<sup>10,11</sup> In general, considering that both patients were from Afghanistan and the facilities for diagnosing lung diseases in that country are not enough, it seems that, due to the emergence of this disease, *Lophomonas* infection is possibly common in Afghan patients. Overall, our report at least sheds some new light on the distribution of a new pathogen in Afghanistan.

There is little knowledge about various aspects of pulmonary lophomoniasis, as well as the true global burden of this neglected protozoan disease.<sup>8,12</sup> However, according to data extracted from the last decades' published literature and reviewed, most reported cases were found in Iran.<sup>7,12</sup>

The results of a systematic review revealed that of 307 examined cases, the most were related to Asian countries, such as Iran (237 cases), with the maximum numbers followed by China, Turkey, India, and Malaysia.<sup>12</sup>

However, there is no evidence of lophomoniasis in Afghanistan, which is located in eastern Iran's neighbor. For socioeconomic reasons and civil wars, the country does not have a suitable platform in terms of medical facilities. Thus, every year, many patients from this country travel to Iran for their medical procedures as tourists. On the contrary, the disease over the last decades has been recorded in limited areas around the world, and this issue may lead to the distribution of this emerging disease via tourism and also the population migration phenomenon.

Due to its emergence and lack of adequate knowledge of lophomoniasis among physicians and parasitologists in various countries of the world, and on the contrary, the lack of citations to this disease in infectious and pathological textbooks, as well as few studies conducted in the last decade on its clinical and diagnostic features, with the exception of a few countries, it should be considered as a neglected tropical disease. Accordingly, it is not possible to provide an accurate estimate of the global burden of the disease. Therefore, in order to clarify the various aspects of the disease and overcome the aforementioned problems, more studies should be conducted in different parts of the world.

### 4 | CONCLUSION

Patients with pulmonary symptoms such as chronic cough, dyspnea, and hemoptysis who have unexplained radiological findings that do not respond to broad-spectrum antibiotics should be considered as pulmonary lophomoniasis. As a result, in cases of suspected disease, clinical specimens, particularly bronchial lavage or sputum, should be examined for the diagnosis of pulmonary lophomoniasis using microscopic and molecular examinations, and appropriate treatment should be initiated.

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Declared none.

#### CONFLICT OF INTEREST

None declared.

#### AUTHOR CONTRIBUTIONS

HZ and MN involved in the collecting of samples and data. ASH, MF, ZZ, and ESB comprised in the interpretation, writing, and editing of the manuscript. MF and MS prepared the draft and final version of the manuscript. MF and ZZ are incorporated in judgmentally revising the full manuscript. All authors reviewed and approved the final version of the manuscript.

## ETHICAL APPROVAL

The study was approved by our local ethics committee.

## CONSENT

Written informed consent was obtained from the patient's parents of case1, and also, in case 2, it was obtained from the patient.

## DATA AVAILABILITY STATEMENT

The data are available with the corresponding author and can be achieved on request.

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