Bronchopulmonary Lophomoniasis in a Prisoner: A Case Report

Running title: Bronchopulmonary Lophomoniasis in a Prisoner

Sadeghali Azimi

Infectious Diseases Research Center, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran, drsazimi@yahoo.com, 0000-0002-1903-314X

Bahareh Bashardoust

Department of Medical Parasitology and Mycology, Faculty of Paramedicine, Golestan University of Medical Sciences, Gorgan, Iran, 0000-0002-0008-7367

Mohammad Hadi Tajik Jalayeri

Clinical Research Development Unit, Sayad Shirazi Hospital, Golestan University of Medical Sciences, Gorgan, Iran, drtgtg@yahoo.com, 0000-0001-5570-7239

Corressponding author: Mohammad Hadi Tajik Jalayeri

Email: drtgtg@yahoo.com

Tel: 09113712015

Address: Clinical Research Development Unit, Sayad Shirazi Hospital, Golestan University of Medical Sciences, Gorgan, Iran

Abstract

Background: Bronchopulmonary lophomoniasis, caused by the flagellated protozoan *Lophomonas blattarum*, is an emerging but underrecognized respiratory infection. While typically reported in immunocompromised individuals, cases in immunocompetent hosts, particularly in high-risk environments such as prisons, remain rare.

Case Presentation: A 47-year-old incarcerated male from Golestan Province, Iran, presented with a four-month history of persistent cough, dyspnea, and purulent sputum. Initial investigations, including blood and sputum cultures, were negative for bacterial and fungal pathogens. Bronchoalveolar lavage (BAL) microscopy identified *Lophomonas blattarum* trophozoites, confirming the diagnosis. Notably, serum IgE levels were elevated (387 kU/L; normal <160 kU/L), suggesting a possible allergic component or parasitic co-infection. The patient achieved complete symptomatic resolution following a four-week course of metronidazole.

Conclusion: This case underscores lophomoniasis as a differential diagnosis for chronic respiratory symptoms, particularly in poor hygiene. Enhanced clinical suspicion and BAL microscopy are critical for diagnosing similar populations accurately.

Keywords: *Lophomonas*, Lophomoniasis, Bronchopulmonary, Pulmonary infection, Iran

Introduction

Lophomoniasis is a disease caused by *Lophomonas* spp, an anaerobic protozoan [1] that can lead to respiratory illnesses in humans [2-4]. The transmission of *Lophomonas* to humans remains unclear, although certain environmental situations such as rain, temperature, humidity, and geographic latitude have been considered to facilitate the development of the transmitter *Lophomonas blattarum* (*L. blattarum*) [5,6]. Second, the lifestyle of the population at risk, such as a work environment with dirty and muggy conditions, allows for continuous inhalation or ingestion of *Lophomonas* cysts [7,8]. *Lophomonas blattarum* was described by Samuel Stein in 1860, from the gut of the cockroach *Blatta orientalis* [9]. This protozoan is round to oval in shape and 20–60 μm in diameter with an apical tuft of numerous flagella[9]. Individuals in close contact with these insects can become infected through inhaling the excreted cysts. Therefore, inhalation is the sole transmission route for lophomoniasis. Some secreted proteases may induce chronic inflammatory phenomena such as asthma and potential alterations in immunoglobulins like IgA and IgE[4,10]. Upon exposure, humans experience an acute inflammatory response leading to the development of symptoms [9,10].

Lophomonas primarily causes bronchial and pulmonary diseases in humans, although cases of upper respiratory tract infections such as sinusitis have also been reported [11,12]. The clinical manifestations, laboratory findings, and radiological features of *Lophomonas* spp infections of the lower respiratory tract are nonspecific and cannot be easily distinguished from respiratory infections caused by common pathogens. Diagnosis may be established by identifying the unicellular organisms in bronchoalveolar lavage (BAL) fluid or bronchial specimens through direct microscopy in the presence of clinical and radiological signs of bronchitis or pneumonia [2,4]. The report of human infection from China was published in 1993 [13]. In Iran, the first case of respiratory infection caused by *L. blattarum* was reported in 2014. The case involved a young girl who was hospitalized due to sinusitis and respiratory symptoms [13,14]. Various studies confirm the rarity of this disease worldwide [4]. In this study, we present a case of pulmonary lophomoniasis in a prisoner, underscoring the diagnostic and therapeutic challenges associated with this condition.

Case presentation

A 47-year-old incarcerated male with a six-month history of imprisonment presented with a four-month duration of productive cough, progressive dyspnea, and orthopnea, followed by two episodes of non-massive hemoptysis two months before admission. His medical history included type 2 diabetes mellitus, hypertension, and a prior appendectomy, with no reported use of tobacco, alcohol, or illicit substances. His current medications comprised losartan (25 mg twice daily), metformin (500 mg twice daily), clopidogrel (75 mg daily), aspirin (80 mg daily), and Nitrocontin (2.6 mg twice daily). Due to clinical suspicion of pulmonary tuberculosis (TB), empiric anti-TB therapy was initiated with daily isoniazid (75 mg), rifampicin (150 mg), pyrazinamide (400 mg), and ethambutol (275 mg).

Upon hospitalization, the patient was hemodynamically stable with an oxygen saturation of 98% on room air. High-resolution computed tomography (HRCT) of the chest revealed a pulmonary cavity, raising concerns for TB or fungal infection. Initial laboratory investigations demonstrated normal leukocyte counts but elevated inflammatory markers (Table 1). Abdominal ultrasonography revealed grade 2-3 hepatic steatosis, without evidence of hydatid cysts, and the serum anti-hydatid IgG ELISA was negative. Flexible bronchoscopy with bronchoalveolar lavage (BAL) from the right lower lobe was performed, with samples sent for bacterial and fungal cultures, acid-fast bacilli (AFB) smears (x3), Mycobacterium tuberculosis PCR (MTB-PCR),

Lophomonas microscopy, and cytological examination. Bacterial and fungal cultures showed no growth, negative AFB smears, and undetected MTB-PCR. However, BAL microscopy identified *Lophomonas* spp. (Figure 1), and serum IgE was elevated at 387 IU/mL (normal <160 kU/L), supporting a parasitic etiology. The spiral CT scan of the lungs revealed a thick-walled cavitary lesion in the middle lobe of the right lung (Figure 2).

Based on these findings, pulmonary lophomoniasis was diagnosed, and the patient was started on metronidazole (500 mg every 6 hours) for four weeks, resulting in the complete resolution of hemoptysis, dyspnea, and productive cough. This case underscores the diagnostic challenge of differentiating pulmonary lophomoniasis from TB in endemic regions, particularly in high-risk populations such as incarcerated or immunocompromised individuals. The presence of *Lophomonas* in BAL, the absence of alternative pathogens, elevated IgE, and clinical response to antiprotozoal therapy confirmed the diagnosis. Clinicians should consider this rare parasitic infection in TB-suspected cases lacking microbiological confirmation to avoid unnecessary anti-TB therapy and ensure appropriate treatment.

Discussion

Pulmonary lophomoniasis is an emerging infectious disease with multiple identified transmission mechanisms [5]. Occupation and living conditions are key risk factors, increasing direct exposure to the transmitter, as seen in our patient. The highest prevalence of lophomoniasis cases is reported in Latin America and Asia, which can be attributed to environmental and occupational conditions that favor the presence of cockroaches [9] [7,15]. In this case, the patient resided in environments with poor hygiene, making him susceptible to contact with lophomoniasis cysts.

Diagnosing pulmonary lophomoniasis is challenging due to its nonspecific symptoms and the potential overlap with other respiratory conditions. This often leads to misdiagnosis as Chronic Obstructive Pulmonary Disease (COPD), bacterial pneumonia, or TB. The similarity in clinical manifestations can complicate accurate identification, underscoring the importance of thorough diagnostic evaluations [16,17]. In previous studies, cases of lophomoniasis, TB, and hydatid cyst infection have been documented, highlighting the complexities in accurately diagnosing these conditions. Clinicians often face challenges in the early stages of these diseases, as symptoms may overlap significantly. Particularly in the case of TB, initial clinical manifestations can lead healthcare professionals to suspect this infectious disease based on historical data and symptomatology[18-20]. In our case, the patient was initially diagnosed with pulmonary TB, and a four-drug regimen was started. However, this diagnosis was later ruled out. The definitive diagnosis of pulmonary lophomoniasis requires direct visualization of the parasite in samples such as sputum, tissue, and secretions obtained through bronchofibroscopy and BAL [7]. In this instance, the diagnosis was confirmed using bronchofibroscopy and BAL analysis.

The therapeutic approach for pulmonary lophomoniasis involves administering metronidazole either orally or intravenously at a dose of 500 mg every 8 hours for 20 to 30 days, depending on the severity of the infection [21]. In the present case, the initiation of metronidazole treatment led to significant clinical improvement, including the resolution of hemoptysis.

Based on our clinical observations, we propose that pulmonary lophomoniasis be considered in the differential diagnosis alongside TB and hydatid cysts, especially for patients who do not respond to antibiotic treatment. Furthermore, individuals with high-risk epidemiological indicators should be evaluated for this infection. The presence of hemoptysis and cavitated lesions, similar to those observed in our patient, should heighten suspicion for potential microbiological co-infection. Therefore, we recommend bronchoscopy as the preferred sampling technique. In cases

where specific laboratory diagnostics are unavailable, the use of metronidazole may be beneficial in preventing further clinical complications. Also, we recommend testing for Lophomoniasis before starting treatment for smear-negative tuberculosis.
Several limitations of this case presentation include the lack of a control group, which limits the ability to generalize findings. The patient's unique background as a prisoner may introduce confounding factors affecting health outcomes. Additionally, the absence of comprehensive follow-up data restricts the assessment of long-term treatment efficacy. Lastly, incomplete drug history details hinder a full understanding of potential drug interactions and their impact on the patient's condition.

Conclusion

This case illustrates the diagnostic pitfalls in pulmonary infections when atypical pathogens are involved. Lophomoniasis, though rare, should be included in the differential diagnosis of TB-like presentations, especially in smear-negative cases with poor treatment response. Heightened clinical suspicion, coupled with targeted diagnostics (e.g., BAL microscopy), can avert prolonged misdiagnosis and guide appropriate therapy. Future studies should explore optimal IgE cutoffs and alternative antiprotozoals for refractory cases.

Acknowledgement

We sincerely thank the dedicated staff of Sayad Shirazi Hospital for their invaluable support and contributions to this research.

Funding

The authors received no financial support for the research, authorship, and publication of this article.

Disclosure statement

No potential conflict of interest was reported by the authors.

Declaration of conflicting interests

The authors declared no potential conflicts of interest in the research, authorship, and publication of this article.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Ethical statement

Ethical clearance (Registration number: IR.GOUMS.REC.1403.493) was obtained from the Golestan University of Medical Sciences Ethics Committee.

References

1. de Jesús Alba-Romero J, Nogueda-Torres B, Sánchez-Manzano RM, Alba-Romero DL, Martínez-Romero A. Differential diagnosis of lophomaniasis in patients with COVID-19 in northern Mexico: a case report. *Iberoamerican Journal of Medicine*. 2023;6(1):23-27.

2. Mokhtarian K, Taghipour S, Nakhaei M, et al. Molecular evidence of emerged pulmonary lophomoniasis due to Lophomonas blattarum among hospitalized patients in southwestern Iran: A national registry-based study. *Interdisciplinary Perspectives on Infectious Diseases*. 2022;2022
3. Fakhar M, Nakhaei M, Sharifpour A, et al. First molecular diagnosis of lophomoniasis: the end of a controversial story. *Acta Parasitologica*. 2019;64:390-393.
4. Nakhaei M, Fakhar M, Sharifpour A, Ziaei Hezarjaribi H, Banimostafavi ES, Nazar E. Global status of emerging Lophomonas infection: a systematic review of reported cases (1993—2020). *Interdisciplinary Perspectives on Infectious Diseases*. 2022;2022
5. Ghatee MA, Nakhaei M, Sharifpour A, et al. Geospatial Analysis and Molecular Epidemiologic Study of Emerging Pulmonary Lophomoniasis in Iran: A National Registry-Based Study. *J Parasitol Res*. 2023;2023:1039186. doi:10.1155/2023/1039186
6. Camargo-Assis F, Máttar S, González M. Lophomonas blattarum cockroach parasite that causes uncommon pneumonia in humans. *Revista MVZ Córdoba*. 2020;25(1):1948.
7. Ding Q, Shen K. Pulmonary Infection with Lophomonas blattarum. *Indian J Pediatr*. Jan 2021;88(1):23-27. doi:10.1007/s12098-020-03311-1
8. Mirzazadeh F, Berenji F, Amini M, et al. Lophomonas blattarum in asthmatic patients and control group. *Journal of research in medical and dental science*. 2017;5(5):1-5.
9. Martinez-Girón R, Cornelis van Woerden H. Lophomonas blattarum and bronchopulmonary disease. *Journal of medical microbiology*. 2013;62(11):1641-1648.
10. das Neves Coelho F, Borralho J, Baptista-Fernandes T, Toscano C, Carmo ME. Characterization of Lophomonas spp. Infection in a Population of Critical Care Patients. *Infectious Disease Reports*. 2024;16(1):83-92.
11. Chaudhury A, Parija SC. Lophomonas blattarum: A new flagellate causing respiratory tract infections. *Tropical Parasitology*. 2020;10(1):7-11.
12. Ding Q, Shen K. Pulmonary infection with Lophomonas blattarum. *The Indian Journal of Pediatrics*. 2021;88:23-27.
13. Chen S, Meng Z. Bronchopulmonary Lophomonas blattarum infection: A case report. *Chin J Parasitol Parasit Dis*. 1993;11:28.
14. Jorjani O, Bahlkeh A, Koohsar F, Talebi B, Bagheri A. Chronic Respiratory Allergy Caused by Lophomonas blattarum: A Case Report. *Medical Laboratory Journal*. 2018;12(2)
15. Talebian M, Berenji F, Amini M, et al. A study about clinical symptoms and laboratory signs of adult and pediatric patients with Lophomonas blattarum. *Journal of Research in Medical and Dental Science*. 2018;6(1):312-317.
16. Zeng H, Kong X, Chen X, Luo H, Chen P, Chen Y. Lophomonas blattarum infection presented as acute exacerbation of chronic obstructive pulmonary disease. *Journal of thoracic disease*. 2014;6(6):E73.
17. Taheri A, Fakhar M, Sharifpour A, Nakhaei M, Banimostafavi ES. Lophomonas and Mycobacterium co-infection: the first molecular evidence to overcome potential diagnostic pitfalls. *Oxf Med Case Reports*. Jul 2022;2022(7):omac064. doi:10.1093/omcr/omac064
18. Jalayeri MH, Zakariaei Z, Fakhar M, Sharifpour A, Banimostafavi ES, Soleymani M. Ruptured pulmonary hydatid cyst and lophomoniasis comorbidity in a young man: a rare case. *Oxford Medical Case Reports*. 2023;2023(3):omad023.
19. Jalayeri MHT, Sharifi far RA, Lashkarbolouk N, Mazandarani M. The co-infection of pulmonary hydatid cyst, lophomoniasis and tuberculosis in a patient with resistant respiratory symptoms; a case report study. *BMC Infectious Diseases*. 2024;24(1):11.

20. Tajik Jalayeri MH, Lashkarbolouk N, Mazandarani M. Diagnosis of pulmonary lophomoniasis in an elderly anthracosis patient with resistant respiratory symptoms: A literature review and a case report study. *Clinical Case Reports*. 2024;12(6):e9085.
21. Vélez NP, Vintimilla RO, Orellana SA. Lung infection caused by Lophomonas blattarum. *Archivos de bronconeumologia*. 2021;57(9):594-596.

Table 1. Laboratory findings of the patient with bronchopulmonary lophomoniasis

Laboratory parameter	Unit	Result	Normal range
White Blood Cell (WBC)	$\times 10^3/\mu L$	5.3×10^3	3.9-10.5
Polymorphonuclear neutrophils (PMN)	%	70	35-80
Hemoglobin (Hb)	g/dL	13.6	13.8-17.2
Platelet count test (PLT)	$\times 10^3/\mu L$	280×10^3	145-420
C-reactive protein (CRP)	mg/L	8.2	0-6 (Neg) 6-20 (1+) 20-40 (2+) 40-60 (3+) >190 (4+)
Spartate Aminotransferase (AST)	units/L	27	<38
Alanine Transaminase (ALT)	units/L	34	<40
Bilirubin Total	mg/dL	0.4	0.3-1.2
Bilirubin Direct	mg/dL	0.2	<0.2
Alkaline Phosphatase (ALP)	IU/L	142	44-147

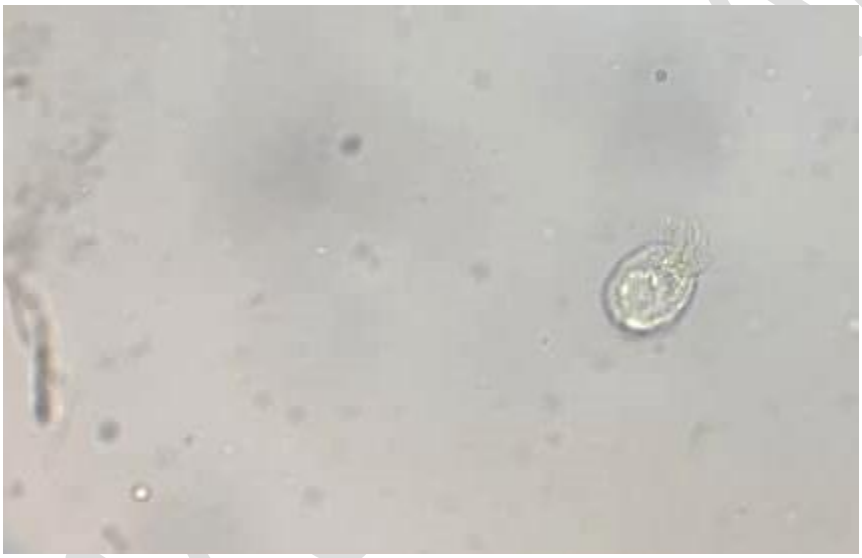

Figure 1. Direct smear of the bronchoalveolar lavage fluid specimen represents *Lophomonas* trophozoite with irregular, long flagella

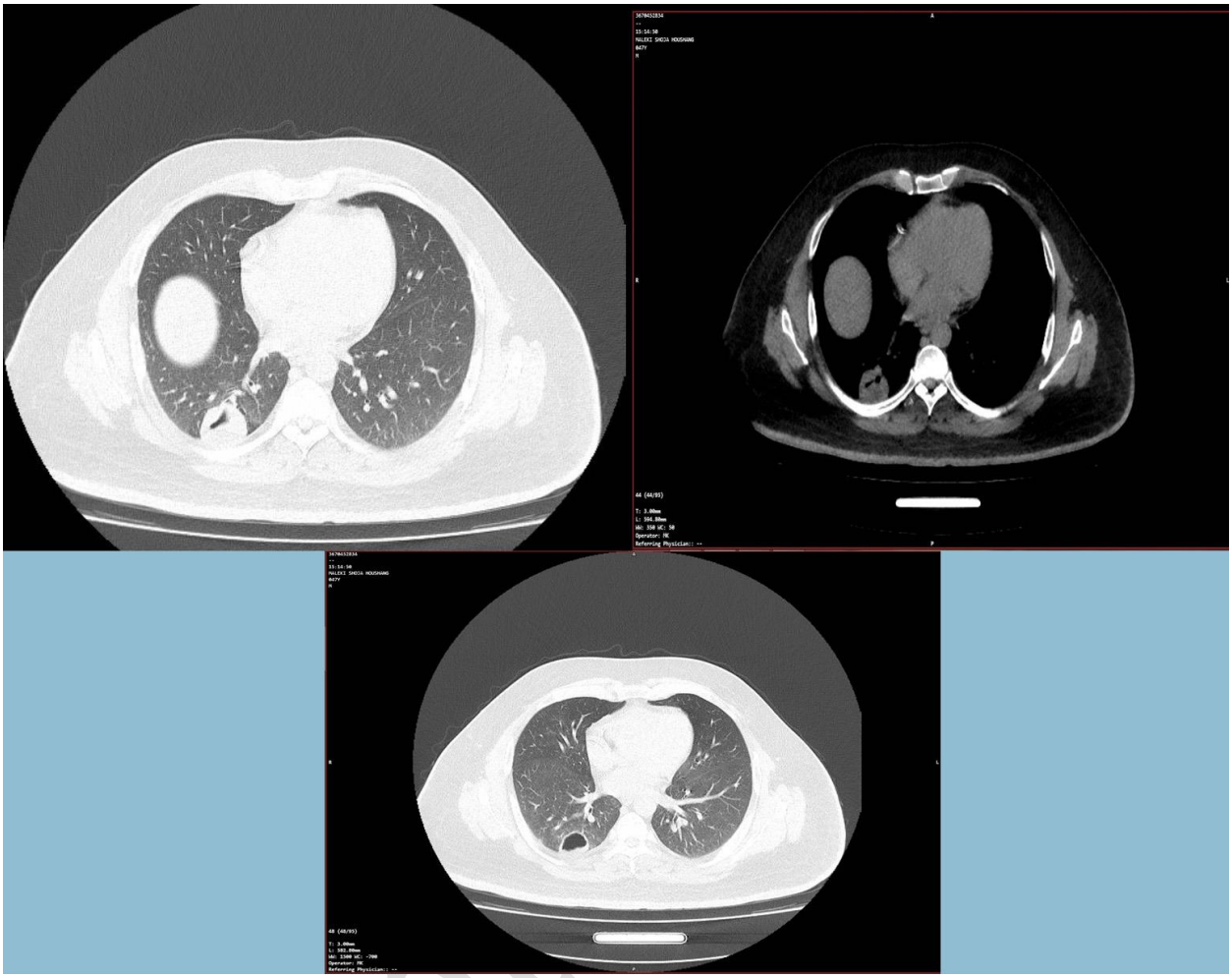

Figure 2. Lung CT scan of the patient with bronchopulmonary lophomoniasis