Monaldi Archives for Chest Disease

eISSN 2532-5264 https://www.monaldi-archives.org/

Monaldi Arch Chest Dis 2024 [Online ahead of print]

To cite this Article:
Samet M, Soleimani Salehabadi H. **Pulmonary infection with an unusual microorganism.** *Monaldi Arch Chest Dis* doi: 10.4081/monaldi.2024.2643

Pulmonary infection with an unusual microorganism

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Contributions: both authors contributed to the design and data interpretation of the work. They have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Conflict of interest: the authors declare that no conflict of interest.

Ethics approval and consent to participate: this study trial was approved by the Ethics Committee of the University of Shahid Sadoughi on December 14, 2022. The committee assessed the planned project as ethically unobjectionable.

Patient consent for publication: the patient's parents gave written permission to use the data and photos of their daughter's disease for the publication of this case report.

Funding: none.

Availability of data and materials: all data used to support the findings of this study are available from the corresponding author upon request.

Acknowledgments: the authors wish to thank the patient and her family for their assistance in conducting this case report. The authors also wish to thank the staff of the Pulmonary and Pathology Department of Shahid Sadoughi Hospital for their assistance in conducting this study.

Abstract

Pulmonary trichomoniasis is an underdiagnosed disease. In most cases, there is an underlying clinical condition related to immunosuppression. The results of molecular biology techniques indicate that trichomonad infections have been significantly underestimated.

A 7-year-old girl with a medical history of suspected juvenile rheumatoid arthritis presented with a fever, chills, and a productive cough. Her chest computed tomography scan indicated a pericardial effusion and consolidation in the left lower lobe. In direct microscopy of the bronchoalveolar lavage fluid, we identified a motile and flagellated organism. Based on the morphology, size, and rolling motility, we identified this organism as *Trichomonas hominis*. The patient's fever stopped after 3 days of intravenous metronidazole administration.

In immunocompromised patients with evidence of pneumonia, sputum or bronchial samples should be examined more carefully. The possibility of unusual pathogens should be considered if they do not respond to antibacterial treatments.

Key words: pneumonia, cough, *Trichomonas hominis*, metronidazole, consolidation.

Introduction

Among the microorganisms that rarely affect the respiratory system are protozoa. The effects of protozoa on the respiratory system, unlike other sites (vagina, urethra, liver, gut, etc.), constitute a relatively uncommon group of diseases [1]. In 1942 the first case of pulmonary trichomoniasis was recorded by Glaubach and Guller [2]. In most cases, there is an underlying clinical condition related to immunosuppression, such as Hematologic malignancies, AIDS, solid organ transplants, immunosuppression therapy, etc. although visiting endemic areas and immigration should also be considered [3]. Trichomonads are a group of flagellated protozoa with four free flagella. The three most common species of trichomonas seen in humans are Trichomonas vaginalis, T. tenax, and T. hominis. Among these, only T. vaginalis is pathogenic while the others exhibit questionable pathogenicity [1]. T. hominis, also known as Pentratrichomonas hominis, is a species that has been less studied in respiratory system infections [4,5]. The purpose of this case report is to consider less common pathogens in pneumonia resistant to conventional treatment, especially in patients with suppressed immune systems.

Case Report

A 7-year-old girl with a history of fever and arthritis since 4 years ago with possible juvenile rheumatoid arthritis (JRA) was treated with prednisolone 5 mg daily and methotrexate (MTX) 10 mg weekly. Four months ago, she was hospitalized due to fever and arthralgia. Her blood test results showed that she had a white blood cell count (WBC) of 14.5 × 10^9/L, hemoglobin (Hb) 9.2 g/dL, and The erythrocyte sedimentation rate (ESR) 86 mm/hour. The computed tomography (CT) scan of the abdomen, pelvis, and lungs was reported as normal. Bone marrow aspiration and bone marrow biopsy did not find any pathological findings other than anemia, and the patient was re-diagnosed with flare-up JRA and was treated with 7.5 mg of prednisolone daily and 10 mg of MTX weekly. Currently, she presents with fever, chills, and productive cough without hemoptysis that started a week ago. On physical examination, her temperature was 38.8 °C, her heart rate was 96 beats/min, her blood pressure was 105/72 mmHg, her respiration rate was 22 breaths/min, and the saturation of pulse oximetry was 96% on ambient air. she looked pale and lethargic. There was no cyanosis or clubbing. On auscultation of the lungs, a crackle was heard in the base of the right lung. Examination of the skin, oral mucosa, and joints was normal. The results of an abdominal examination were unremarkable. The laboratory results at admission indicated a peripheral white blood cells count of 30.1× 10^9/L with 80.0% neutrophils. She had anemia with hemoglobin of 10.2g/dL and a hematocrit of 28.6%. The patient's ESR was 106 in the first hour. The level of C-reactive protein was 128.62 mg/L and the level of procalcitonin was 11.72 ng/mL. The

results of the liver function test, urine analysis, and lactate dehydrogenase were normal. A chest radiograph and subsequent computed tomography (CT) scan indicated moderate pericardial effusion (Figure 1A) with consolidation in the left lower lobe (Figure 1B). Echocardiography confirmed pericardial effusion, but there is no evidence in favor of tamponade. With the possibility of bacterial pneumonia, empiric treatment with broad-spectrum antibiotics including imipenem and clindamycin was added to previous medications such as prednisolone 7.5 mg. 72 hours after the start of antibiotic treatment, the patient was febrile and looked ill. The patient's sputum sample was sent for culture and smear for bacteria, fungi, and tuberculosis; no microorganisms were reported. Flexible fiberoptic bronchoscopy and bronchoalveolar lavage (BAL) fluid were performed. Bronchial fluid lavage was sent for culture and smear of bacteria, fungi, Nocardia, and Mycobacterium tuberculosis. We performed direct microscopy of a wet smear cytocentrifuged preparation created with 100 µL of BAL sediment and identified a motile and flagellated organism (Figure 2). We identified this organism as Trichomonas hominis based on the morphology, size, and wobbly and rolling motility. Intravenous metronidazole 150 mg every 8 hours was prescribed. After three days, the patient was afebrile and in the controlled chest CT scan after 9 days the left lower lobe consolidation and pericardial effusion were diminished (Figure 3).

Discussion

Most articles about pulmonary trichomoniasis are case reports. In the review of articles, Trichomonas tenax and vaginalis are the most common species causing lung infections. A study highlighted the occurrence of pulmonary trichomoniasis in 19 of 112 patients (17%), predominantly in those with lung cancer, lung abscess, or bronchiectasis. Trichomonas tenax, was identified as the causative agent. The study suggested the use of metronidazole for treatment [6]. In another case report, an 80-year-old female with a history of type II diabetes was hospitalized due to a coma following a car accident. She developed severe pneumonia and acute respiratory distress syndrome. Metagenomic next-generation sequencing (mNGS) of bronchoalveolar lavage fluid revealed the presence of Trichomonas vaginalis. The patient was treated with ornidazole, resulting in significant improvement and eventual discharge from the hospital [7]. Stratakis and his colleagues have reported a 45-year-old female with a history of sarcoidosis presented with a dry cough, exertional dyspnea, and malaise. The patient had a history of sarcoidosis of the lungs, which had been asymptomatic for 20 years. The diagnosis of pulmonary trichomoniasis was made based on the cytological identification of T. tenax trophozoites in the bronchoalveolar lavage. Treatment with oral metronidazole led to complete recovery from symptoms [8]. One of the reported complications of Trichomonas infection is pleurisy. A 67-year-old patient with

glioblastoma who presented with severe pleurisy in the post-operative period while receiving high-dose corticosteroid therapy. Several motile flagellated protozoa were identified in the pleural fluid, and Trichomonas tenax was identified by molecular methods [9].

Although the number of pulmonary Trichomonas infection cases has increased over the years using polymerase chain reaction (PCR) test and metagenomic next-generation sequencing (mNGS) techniques, a search in PUBMED and Google Scholar found no similar cases of pulmonary infections caused by T. hominis in the past 10 years. it shows that this disease is rare. Trichomonas hominis lives in the small and large intestines and is spread through contaminated food and liquids. It has been reported in cases of intrathoracic fistula, subdiaphragmatic abscess, and empyema in patients after gastrectomy [6].

Because trichomoniasis can have an unusual course and be asymptomatic, microbiological testing is required to accurately diagnose the disease [10]. Diagnosis is first made by direct microscopic examination. Most authors of published case reports believe that wet specimens and direct microscopy are easy methods to identify microorganisms based on their rapid, wobbly, and rolling movements [6,11]. Since most of the morphological characteristics of Trichomonas are lost during the fixation process, gram staining is not very diagnostic [12], but Giemsa staining is useful [13]. Results from polymerase chain reaction and other molecular biology techniques indicate that trichomonal infections have been significantly underestimated in the past [14].

Our case had her JRA and was treated with prednisolone, which explains her immunodeficiency. In a previous study of RA patients, treatment with immunosuppressive drugs and high disease activity increased the risk of opportunistic infections [15]. In the literature review, metronidazole (MTZ) has been the most effective treatment for trichomoniasis [16]. The 2021 U.S. Centers for Disease Control and Prevention (CDC) guidelines for the treatment of VT include a single dose of 2 g of MTZ as the recommended treatment regimen. If a patient fails single-dose MTZ therapy, a single dose of tinidazole (TNZ) or 400 to 500 mg twice daily may be administered for 7 days. If this fails, 2 g of MTZ or TNZ can be administered for 5 days [17].

Conclusions

This case report and similar cases emphasize the importance of considering rare infectious agents in patients with pneumonia symptoms that do not respond to standard treatments, especially in immunocompromised patients. They also emphasize the need for advanced diagnostic techniques, such as molecular methods, to identify these atypical pathogens and improve patient outcomes.

References

1. Lednicky JA, Rayner JO. Uncommon respiratory pathogens. Curr Opin Pulm Med 2006;12:235-9.

2. Glaubach N, Guller EJ. Pneumonia apparently due to Trichomonas buccalis. JAMA 1942;120:280-1.

3. Vijayan VK. How to diagnose and manage common parasitic pneumonias. Curr Opin Pulm Med 2007;13:218-24.

4. Memik F. Trichomonads in pleural effusion. JAMA 1968;204:1145-6.

5. Jongwutiwes S, Silachamroon U, Putaporntip C. Pentatrichomonas hominis in empyema thoracics. Trans R Soc Trop Med Hyg 2000;94:185-6.

6. Hersh SM. Pulmonary trichomoniasis and Trichomonas tenax. J Med Microbiol 1985;20:1-10.

7. Li Z, Wang J, Gou X, et al. Trichomonas vaginalis in bronchoalveolar lavage fluid of a patient with severe pneumonia detected by metagenomic next-generation sequencing: a case report. Medicine 2023;102:e35777.

8. Stratakis DF, Lang SM, Eichenlaub S, et al. Pulmonale trichomoniasis: diagnose durch erregernachweis in der bronchoalveolären lavage. Pneumologie 1999;53:617-9. [Article in German].

9. Leterrier M, Morio F, Renard BT, et al. Trichomonads in pleural effusion: case report, literature review and utility of PCR for species identification. New Microbiol 2012;35:83-7.

10. Radonjic IV, Dzamic AM, Mitrovic SM, et al. Diagnosis of Trichomonas vaginalis infection: the sensitivities and specificities of microscopy, culture and PCR assay. Eur J Obstet Gynecol Reprod Biol 2006;126:116-20.

11. Osborne TP, Giltman LI, Uthman EO. Trichomonads in the respiratory tract. A case report and literature review. Acta Cytol 1983;28:136-8.

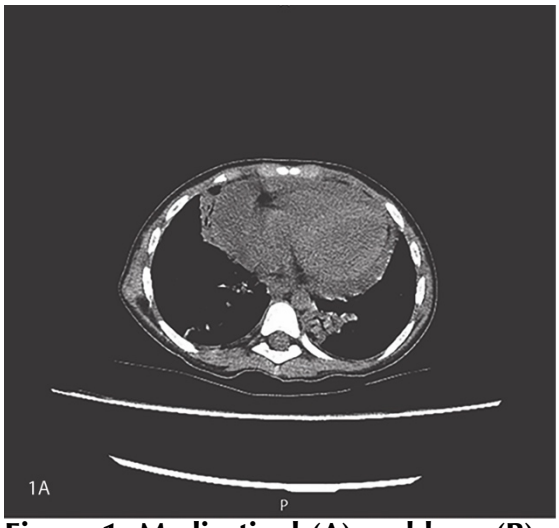
12. Yao C, Ketzis JK. Aberrant and accidental trichomonad flagellate infections: rare or underdiagnosed? Trans R Soc Trop Med Hyg 2018;112:64-72.

13. Fernando SD, Herath S, Rodrigo C, Rajapakse S. Improving diagnosis of trichomonas vaginalis infection in resource limited health care settings in srilanka. J Glob Infect Dis 2011;3:324-8.

14. Wu Y, Ye Y, Yang Y, et al. Pyopneumothorax from coinfection by Trichomonas tenax and Geotrichum capitatum in a child from China: a case report. BMC Infect Dis 2021;21:842.

15. Au K, Reed G, Curtis JR, et al. High disease activity is associated with an increased risk of infection in patients with rheumatoid arthritis. Ann Rheum Dis 2011;70:785-91.

16. Wendel KA, Workowski KA. Trichomoniasis: challenges to appropriate management. Clin Infect Dis 2007;44:S123-9.
17. Kissinger P. Trichomonas vaginalis: a review of epidemiologic, clinical and treatment issues. BMC Infect Dis 2015;15:307.



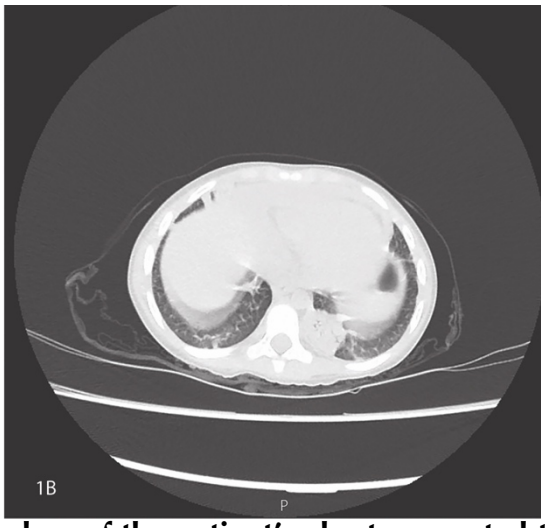


Figure 1. Mediastinal (A) and lung (B) window of the patient's chest computed tomography scan. This indicated moderate pericardial effusion and consolidation in the left lower lobe.

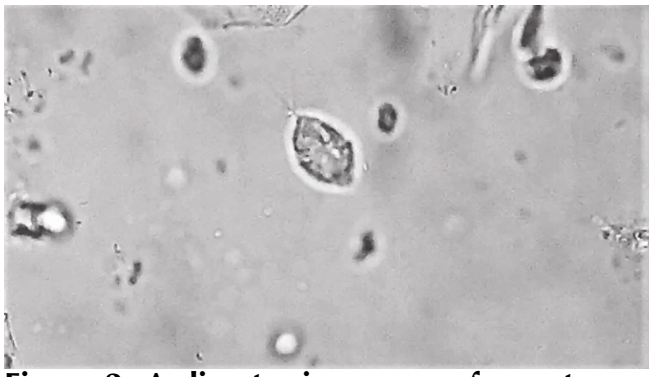
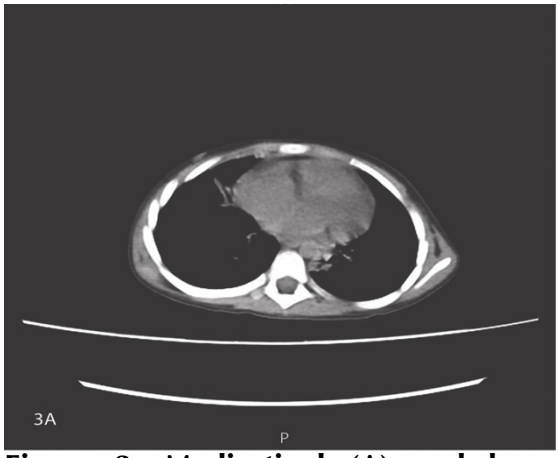


Figure 2. A direct microscopy of a wet smear cytocentrifuged of bronchoalveolar lavage sediment indicated a motile and flagellated organism.



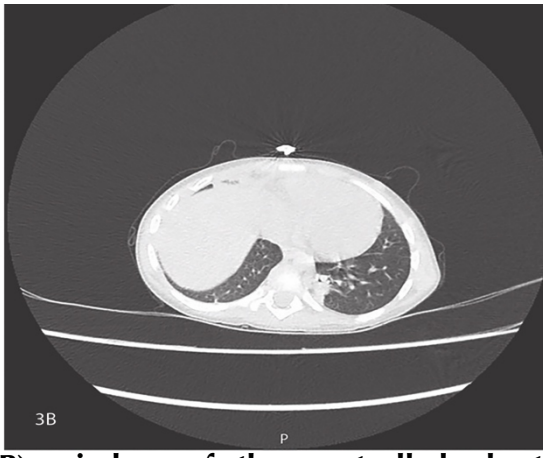


Figure 3. Mediastinal (A) and lung (B) window of the controlled chest computed tomography scan after 9 days. This indicated pericardial effusion and the left lower lobe consolidation was diminished.