

Case Report

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Ciliocytophthoria, A Faux Pas in the way of Diagnosis of Lophomonas Infection

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ABSTRACT

Rationale: In this study, we discuss a case of ciliocytophthoria, an artefact commonly confused in the microscopy of bronchoalveolar lavage fluid for Lophomonas blattarum, which causes a significant diagnostic error.

Patient Concern: A 45-year-old man was admitted in the ICU with symptoms of difficulty in breathing. He was previously admitted in the hospital with COVID pneumonia. His Chest X-ray showed the features of consolidation, and was not responding to broad spectrum antibiotics. With a suspicion of atypical pathogen, the BAL sample was sent. Microscopy revealed motile structures, which were initially confused as a protozoan parasite Lophomonas blattarum. The sputum culture grew mucoid strain of multidrug resistant Pseudomonas aeruginosa, which was treated with tetracycline.

Intervention: The patient was treated with tetracycline 500mg for 5 days and he showed a drastic improvement. Due to lack of resources for molecular test, we sent the video to CDC diagnostic assistance team. It was confirmed as ciliocytophthoria

Outcome: Patient was improved upon therapy

Lesson: Lophomonas blattarum rarely causes disease in humans. Hence, ciliocytophthoria should always be considered as an important differential diagnosis when suspecting of a protozoan parasitic infection in the respiratory tract.

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Introduction

Ciliocytophthoria (CCP) is a degenerative process of the ciliated columnar epithelial cells found in respiratory tract [1]. Typically observed following a viral infection or any other chronic inflammatory conditions. This condition can often lead to diagnostic confusion, particularly with protozoan parasites such as Lophomonas blattarum, due to the preserved motility of the cilia even after the cells are shed. Lophomonas blattarum, a multi-flagellate protozoan parasite, exists in the environment in its cyst form and can cause respiratory infections when inhaled. These infections can manifest as sinusitis, bronchitis, and more severe bronchopulmonary infections [2-5].

Misidentification of CCP as Lophomonas infection can lead to unnecessary treatments, delay in proper diagnosis and start of appropriate therapy. Accurate diagnosis is crucial to ensure appropriate clinical management. In this case report, we discuss a patient who was initially suspected with a Lophomonas infection based on the presence of motile cells in bronchoalveolar lavage but was later correctly identified as having CCP. This case highlights the importance

of distinguishing between these two conditions to avoid diagnostic errors and ensure proper treatment.

Case Report

A 45-year-old adult male was admitted in our hospital with complaints of difficulty in breathing. He had been previously hospitalized due to COVID-19 for a duration of 2 weeks. After 1 week of discharge, the patient developed breathlessness. Although his chest X-ray was normal, CT chest showed some consolidation in the left lower lobe of lung. Meanwhile, the patient was started empirically on IV meropenem 1g TID. With the suspicion of post-viral pneumonia, sputum culture was performed, showing no growth and it was reported as sterile. As the patient did not show any clinical improvement, bronchoscopy was performed on day 5 with a suspicion of an atypical pathogen. Bronchoalveolar lavage was sent to the microbiology laboratory, we performed the diagnostic assays with non-culturable pneumonia as one of the differentials. To rule out the possibility of Mycobacterium tuberculosis, Gene Xpert was performed, and for nontuberculous mycobacteria, MGIT culture was performed. To rule out fungal pathology, KOH mount examination and fungal culture were performed. All results were negative.

Wet mount examination was performed to look for any parasites, which showed the presence of a motile round and amoeboid structures exhibiting a to-and-fro oscillatory motion resembling a trophozoite of the parasite (Supplementary file 1). With a suspicion of Lophomonas blattarum infection, patient was started on tetracycline 500 mg TID. Aerobic and anaerobic bacterial cultures were performed. Aerobic culture showed a small growth of a mucoid strain of Pseudomonas aeruginosa, which was resistant to ceftazidime, ciprofloxacin, aztreonam, piperacillin-tazobactam, cefoperazone-sulbactam, imipenem, and meropenem by both disk diffusion and automated broth microdilution (BD Phoenix ID/AST) reported on day 3. Anaerobic culture was performed in a GasPak, and no growth was observed after 72 hours. As there was clinical improvement seen in the patient, tetracycline was continued for 5 days. The patient recovered in these 5 days and was discharged. Patient was completely recovered in the follow-up after 1 week.

Meanwhile, due to limitations in performing molecular studies, we sent the microscopic video recorded to CDC diagnostic assistance team. We received the report as it to be CCP.

Discussion

Ever since the pandemic, the number of patients presenting to the hospital with post-viral respiratory tract infection has increased. This increase is majorly due to the secondary infections caused by bacteria, fungi, other viruses and a very negligible cases are due to parasites [6-8]. The protozoan parasites that are known to cause respiratory infections are Lophomonas blattarum, Balantidium coli, Entamoeba histolytica, Babesia, Leishmania donovani, Plasmodium spp and Toxoplasma gondii. Of the above-mentioned protozoan parasites, the motile trophozoite forms are seen only with Lophomonas blattarum, Balantidium coli and Entamoeba histolytica [9,10].

However, an intriguing imposter CCP, tricks the microbiologist into making the incorrect diagnosis. In terms of size, shape, and motility, CCP is strikingly comparable to these motile trophozoites. Among these parasitic causes of respiratory infections, the case reports of Lophomonas blattarum infection tops the list. According to a recent metanalysis, approximately 76 case reports have been published till date with only 3 cases being correctly diagnosed [8].

The trophozoites of Entamoeba spp can be differentiated by the mere fact of its motility by pseudopods and not by flagella. Whereas in case of Lophomonas and Balantidium coli, the motility is conferred by flagella and cilia respectively. Balantidium coli is differentiated by the presence of cilia throughout the surface, unlike CCP which is motile only on one side. In a study conducted by Chaudhury et al, the characteristic features to differentiate Lophomonas and CCP are listed as follows- absence of terminal bar at the origin of the cilia, presence of nucleus opposite to the flagellar end, irregular arrangement of the flagella and the round/pyriform shape of the cell in case of Lophomonas blattarum. CCP is a degenerative process of the ciliated columnar epithelial cells found in bronchial epithelium. The reason for the retained motility of these cells even after being shed is due to the autonomous nature of functioning of the microtubules in cilia by ATP driven dynein motor protein complex till the ATP reserve of the cell is exhausted [11].

In this case the patient had a respiratory infection due to mucoid strain of Pseudomonas aeruginosa, which was non responsive to meropenem. The patient responded drastically with the addition of tetracycline 500mg once daily for 5 days. Patient recovered in next 5 days and was discharged. Subsequent cultures were sterile. This clinical improvement convinced the suspicion of Lophomonas. However, after the confirmation from CDC on CCP, we performed

thorough literature search which are showing some clinical trials utilizing tetracycline for the treatment of MDR Pseudomonas aeruginosa made us rethink our decision [12].

Conclusion

Parasitic infections of the respiratory tract are extremely rare. CCP should always be considered as an important differential diagnosis in patients with history of long-standing lung injury secondary to infection. Caution must be taken, not to misdiagnose Lophomonas blattarum infection which are frequently confused with CCP due to the structural similarities in microscopy. This may lead to misdiagnosis, inappropriate use of antibiotics as well as delay in the initiation of proper treatment resulting in long term consequences.

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