Case Report

Tetra-trichomonas in pyopneumothorax

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ABSTRACT

Pleural trichomonosis is clinically rare, and very few cases of trichomonal empyema have been reported so far. A rare case of an 81-year-old woman with pyopneumothorax presenting with recurrent fever and macroscopic pyuria was present. Microscopic examination of the pleural effusion showed mobile flagellated protozoa which molecular methods identified as Tetratrichomonas. In addition, Streptococcus anginosus was discovered in pleural fluid cultures. Treatment with imipenem/clastatin and metronidazole successfully eliminated the pathogens and led to relief of clinical symptoms. In the context of a review of the relevant literature, the clinical application of molecular methods in the diagnosis of pleural trichomonosis is underlined.

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1. Introduction

Pleural trichomonosis is a clinically rare event, and very few cases of trichomonal empyema have been reported. In recent years pleural trichomonosis has emerged as a subject of interest as detection methods shift to molecular identification rather than microscopic examination [1]. The present molecular and phylogenetic identification of trichomonal species in trichomonal empyema primarily includes Trichomonastenax (T. tenax), Trichomonas vaginalis (T. vaginalis) and Pentatrichomonashominis (P. hominis) [2]. In contrast to the commensal organisms Trichomonastenax, Trichomonas vaginalis and Pentatrichomonashominis, Tetratrichomonas is a newly recognized human-host-adapted trichomonal species [3]. In addition to isolation from the oral cavity and bronchi, the discovery of tetratrichomonas in empyema raised the question of the zoonotic potential of trichomonads. To our knowledge, only 4 cases of tetratrichomonas infestation of pleural empyema have been reported in the English-language medical literature to date [4-6]. Herein the case report covers a case of pyopneumothorax co-infected with Tetratrichomonas species and Streptococcus anginosus manifesting as recurrent fever. This review of disease characteristics within this rare case as well as relevant reported literature may contribute to recognition of the disease.

2. Case report

The patient, an 81 year old female, lives locally in Yuhuan Country. She was admitted to the People’s Hospital of Yuhuan Country on June 5, 2018 due to repeated fever and macroscopic pyuria lasting 4 days. Before admission, she was asked to be treated with 2 g qd of ceftriaxone for anti-infection supplemented with alcohol perineal local disinfection for 3 days in the local hospital. This achieved relief of macroscopic pyuria but fever was still present. CT examination of chest and abdomen in the Outpatient Department in our hospital on June 5, 2018 showed two lung infections, left purulent pneumothorax, left pleural effusion for anti-infection supplemented with alcohol perineal local disinfection for 3 days in the local hospital. This achieved relief of macroscopic pyuria. CT examination of chest and abdomen showed two lung infections, left purulent pneumothorax, left pleural effusion. The patient had past history of type 2 diabetes for more than 20 years treated with acarbose and repaglinide, history of hypertension for more than 20 years treated with nitrendipine, and history of cerebral infarction 15 years prior leading to persistent right limb weakness. She suffered a second cerebral infarction 3 months ago and was left with unclear speech. She denied a history of hepatitis B, tuberculosis or other infectious diseases. Hospital physical examination showed that her temperature was 37.8 °C, heart rate was 102 times/min, blood pressure was 136/76 mm Hg (1 mm Hg = 0.133 kPa), breathing rate was 22 times/min, lip had no cyanosis, left lung respiratory movement decreased, left chest percussion gave dull sounds, heard wet rale in bottom left lung, right lung sound was normal no dry or wet rale. Moreover, WBC was 24.7 × 109/L, neutrophil percentage was 94%, lymphocyte percentage was 4%, eosinophil percentage was 0.0%, c-reactive protein was 200.85 mg/L, procalcitonin was 4.950 ng/ml, blood glucose was 6.2 mmol/L, albumin was 26.8 g/L, creatinine was 43 μmol/L. The pleural effusion was yellow and turbid with nuclear cell count of 46,000/μL.
neutrophil percentage was 85%, lymphocyte percentage was 10%, and eosinophil percentage was 0.0%. Rivalta test was positive, and microscopy showed that active protozoa was similar to trichomonas (Fig. 2a). *Tetratrichomonas* was identified by PCR in pleural effusion (Fig. 2b), and *Strepтокoccus anginosus* was cultured from pleural effusion. Microscopic examination for *Trichomonas* both in oral cavity and pharynx was negative. Urine WBC was 692/μl, *Escherichia coli* cultured the urine were positive for ESBL drug sensitivity and trichomonas microscopic examination was negative. After admission, the patient was given tienam and metronidazole injections for anti-infection. Re-examination of the chest by CT on June 15, 2018 showed absorption of bilateral lung infection and left empyema; a new case of pneumothorax of the left upper lobe, absorption of left pleural effusion with encapsulation, a slight narrowing of left bronchus, and a new case of right pleural effusion (Fig. 1e, f, g, h). Re-examination showed that blood WBC, CRP, pleural fluid examination and urine examination were gradually improved, and no trichomonas was found by hydrotorax microscopic examination. The patient was in stable condition, and she was discharged with medicine with follow-up so far.

3. Discussion

Pleural trichomonosis was once thought to be a rare clinical event; however, current advances in molecular biology imply that the exact occurrence rate has been substantially underestimated over the past decades. In comparison with the well-known pathogenic and causative role of *T. vaginalis* in vaginitis, pleural trichomonosis involves multiple distinct trichomonad species. *T. tenax*, which is a harmless and forms a commensal relationship within the human oral cavity, is suspected to be responsible for pleural trichomonosis by means of aspiration from the oropharynx [7]. Secondary to *T. tenax*, *T. vaginalis* by means of maternal transmission in the process of delivery and *P. hominis* by means of orofaecal contamination may be involved in pleural trichomonosis [8,9]. *T. tenax*, *T. vaginalis* and *P. hominis* are three distinct trichomonad species which parasitize the human oral cavity, vagina and intestine respectively, and the discovery of these trichomonad organisms in the thorax outside of their natural habitats suggests they may cause Pleural trichomonosis.

In addition to the three previously mentioned common trichomonad species, a rare trichomonad species, *Tetratrichomonas*, was identified in the pyopneumothorax in the present case report. The human-host-adapted species *Tetratrichomonas* was thought to be of animal origin and parasitize the oral cavity and bronchi of predisposed patients with chronic pulmonary diseases. As for the entry of *Tetratrichomonas* into the thorax, the patient’s history of cerebral infarction suggests the possibility of aspiration from oropharyngeal secretions. However, similar to reported pulmonary trichomonosis, microscopic examination for *Tetratrichomonas* in sputum, oral wash and urine came back negative [10]. Previous studies suggest that the number of *Tetratrichomonas* in oral-wash is relatively limited and the conventional detection method is not sensitive enough to detect them [11]. However, molecular analysis was only adopted for pleural effusion rather than oral-wash and urine in the present case.
The presence of bacteria as well as microaerophilic conditions is necessary for the proliferation of trichomonad in the thorax [12,13]. In agreement with published literature, routine pathogen culture of the purulent pleural effusion showed the existence of Streptococcus anginosus, which Tetratrichomonas was thought to feed on. Pyopneumothorax/empyema is a serious complication of pulmonary infection and the pathogenic microorganism is supposed to be identical. However, given the impaired tolerance to bronchoscope in aged woman, bronchoalveolar lavage fluid (BALF) was not collected for further bacterial culture or trichomonad detection. We hypothesized that the Streptococcus anginosus and Tetratrichomonas entered the respiratory tract by aspiration at disease onset such as in the condition of pyopneumothorax. Upon the discovery of trichomad through wet preparation evaluation to the clinical manifestations of pyopneumothorax and macroscopic pyuria, and the ineffectiveness of ceftriaxone used outside the hospital. Upon the discovery of trichomad through wet preparation evaluation of empyema fluid, metronidazole was added to the antibiotic regimen. A rapid improvement of the clinical symptoms was observed 2 weeks later.

To better understand the diverse clinical manifestations and therapeutic outcomes of tetratrichomonas-associated pleural empyema, a systematic review of the relevant reports published in the PUBMED database with key words “pleural” and “tetratrichomonas” was carried out. A total of 4 case reports of tetratrichomonas-associated pleural empyema were found (reviewed in Table 1).

Over past decades trichomonal species have not been characterized owing to the effectiveness of metronidazole in eradicating trichomonal species; however, it is important to accurately identify trichomonal species in the era of precision medicine. Microscopic examination is usually limited to the trichomonas genus. Moreover, the diagnosis of trichomonosis is often neglected even by expert parasitologists [8]. The present clinical application of molecular methods such as polymerase chain reaction (PCR) and next-generation sequencing (NGS) would significantly contribute to identification at the species level and the discovery of new species [15]. Despite the rarity of pleural trichomonosis in the clinic, the potential occurrence of trichomonad should be taken into consideration and pleural trichomonosis should be included in the differential diagnosis of pleural effusion. With the systematic usage of molecular biology, the prevalence of the pleural trichomonosis as well as incriminated trichomonal species may become better characterized in the future.

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Table 1 Characteristics of the 4 reported cases of Tetratrichomonas-associated pleural empyema.

<table>
<thead>
<tr>
<th>Character of pleural effusion</th>
<th>Microscopic examination</th>
<th>Molecular analysis</th>
<th>Bacterial co-infection</th>
<th>Therapy</th>
<th>Prognosis</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foul-smelling and purulent</td>
<td>Flagellate</td>
<td>Tetratrichomonas species</td>
<td>Yes</td>
<td>AMX,MTZ</td>
<td>Better</td>
<td>[4]</td>
</tr>
<tr>
<td>Purulent, brownish, and fetid</td>
<td>Flagellate</td>
<td>Tetratrichomonas species</td>
<td>Yes</td>
<td>TAZ/PIP, MTZ</td>
<td></td>
<td>[5]</td>
</tr>
<tr>
<td>Purulent, brownish, and fetid</td>
<td>Flagellate</td>
<td>Tetratrichomonas species</td>
<td>Yes</td>
<td>TAZ/PIP, MTZ</td>
<td></td>
<td>[5]</td>
</tr>
<tr>
<td>Brown, fetid pus</td>
<td>Flagellate</td>
<td>Tetratrichomonas species</td>
<td>Yes</td>
<td>MEPM,MTZ</td>
<td>Death</td>
<td>[6]</td>
</tr>
</tbody>
</table>


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Author's contributions
ND and XWJ drafted the manuscript and interpretation of data, YPX, WDH, YPL and CCS collected the primary data, generated the figures, JHH and KLC contributed to the literature review. All authors read and approved the manuscript.

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Not applicable.

Patient consent for publication
Written informed consent for publication of the clinical details was obtained from the patient.

Competing interests
The authors declare that they have no competing interests.

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