Discover Medicine

Case Report

Pulmonary ascariasis in a child with tuberculosis: a case report on *Ascaris lumbricoides* draining via pleural fluid

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Abstract

Introduction We present a single case of a 10-year-old female with co-infection of pulmonary tuberculosis and pulmonary ascariasis from the Amhara region of Ethiopia, highlighting the rare migration of *Ascaris lumbricoides* from the gastrointestinal tract to the respiratory system. This case adds to the scientific literature by emphasizing the potential for coexisting infections, particularly in regions where both tuberculosis and parasitic infections are endemic, such as Ethiopia.

Clinical findings The patient presented with abdominal pain, productive cough with yellowish sputum, shortness of breath, weight loss, and night sweats. Initially diagnosed with pneumonia complicated by parapneumonic effusion, she exhibited no improvement despite antibiotic treatment.

Primary diagnoses and interventions A presumptive diagnosis of tuberculosis was made, prompting the initiation of antibiotics alongside anti-tuberculosis medications and chest tube drainage. During the management of her condition, an *Ascaris lumbricoides* worm was unexpectedly found in the pleural fluid, leading to a confirmed diagnosis of pulmonary ascariasis.

Outcomes The discovery of the Ascaris worm necessitated adjustments in treatment protocols, highlighting the complexity of managing co-infections in this patient.

Conclusion This case underscores the importance of comprehensive diagnostic evaluations in pediatric patients presenting with respiratory symptoms, particularly in endemic regions. This case underscores the importance of maintaining a broad differential diagnosis in pediatric patients with respiratory symptoms, especially in endemic regions where co-infections are common. It also highlights the need for integrating parasitological evaluations into the diagnostic process to ensure timely and accurate diagnosis.

Keywords *Ascaris lumbricoides* · Pleural effusion · Chest tube · Tuberculosis · Case report

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1 Introduction

Pulmonary ascariasis, although a rare manifestation of *Ascaris lumbricoides* infection, poses significant diagnostic challenges, particularly in pediatric populations. This case report details a unique instance of pulmonary ascariasis in a young female patient, marked by the unusual migration of the parasite from the gastrointestinal tract to the respiratory system. While *Ascaris lumbricoides* is primarily known for causing gastrointestinal symptoms, its potential to migrate and cause respiratory complications is infrequently documented in the literature.

Previous studies have indicated that while the incidence of Ascaris-related respiratory issues is low, cases do occur, especially in regions where both parasitic infections and respiratory diseases, such as tuberculosis, are prevalent [1–3]. The overlap of these infections can lead to misdiagnosis and inappropriate treatment strategies, as seen in this case where the initial diagnosis was pneumonia with parapneumonic effusion. Furthermore, the co-existence of tuberculosis and parasitic infections presents a complex clinical scenario that demands a high index of suspicion and thorough investigation [4–6].

This case not only highlights the rarity of pulmonary ascariasis but also emphasizes the need for clinicians to maintain a broad differential diagnosis when evaluating respiratory symptoms in children, particularly in endemic regions such as Ethiopia. The findings underscore the importance of integrating parasitological evaluations into the diagnostic process for patients presenting with respiratory complaints, ultimately aiming to improve patient outcomes through timely and appropriate treatment interventions.

The following points can be learned from this case

- Broad Differential Diagnosis: Always consider a wide range of potential diagnoses in pediatric respiratory cases, as atypical presentations can arise from less common conditions, such as parasitic infections.
- Vigilance in Treatment Response: Maintain a high index of suspicion for alternative diagnoses when patients do not respond to standard treatments, prompting further investigation
- Awareness of Endemic Conditions: Be mindful of endemic diseases, such as pulmonary ascariasis, particularly in regions where they are prevalent, to ensure timely and effective management.

2 Case presentation

This patient was last relatively healthy 2 weeks back, at which time she started to experience recurrent abdominal pain, loss of appetite, and gastrointestinal symptoms, including nausea and vomiting. She was taken to a local health center for this complaint, where she was treated symptomatically.

One week later, she started to experience a productive cough with whitish sputum, accompanied by chest pain and worsening dyspnea. The associated symptoms include night sweats, low-grade intermittent fever, and significant weight loss. Otherwise, she had no past medical history and no known allergies. Her immunizations are up to date. She has no family history of a similar illness. She has a history of contact with a person reported to have a history of tuberculosis in the vicinity. She lives in a rural part of Ethiopia, an area endemic for both tuberculosis and *Ascaris lumbricoides*.

2.1 Physical examination

- General appearance: acutely sick-looking and in severe respiratory distress.
- Vital Signs: Heart Rate 133 bpm (Tachycardic), Temperature 37.9 °C (Febrile), Respiratory Rate 48 (tachypneic), Oxygen Saturation: 77% (desaturated)• Respiratory system Examinations: On inspection, she used her respiration muscles; she had nasal flaring and subcostal and intercostal retractions. On palpation, the trachea is deviated to the right. There was dullness to percussion on the left lower two-thirds of the lung. Air entry was absent over the left lower two-thirds of the lung field on auscultation. Cardiovascular system examination: She is tachycardic, S1 and S2 are well heard, and no murmur or gallop was heard.
- Abdominal Examination. There is mild tenderness in the epigastric region; no organomegaly was noted.

Otherwise, there are no pertinent findings in another system.

3 Investigations

The chest X-ray reveals a massive pleural effusion in the left lung, accompanied by a rightward shift of the trachea and mediastinum. Similarly, the chest ultrasound confirms the presence of a significant pleural effusion in the left lung. The complete blood count (CBC) indicates leukocytosis with a neutrophilic predominance of 86%. Pleural fluid analysis shows a white blood cell count of 66,000 cells/L, with lymphocytes comprising 82%, monocytes 8%, and granulocytes 10%. Pleural fluid cytology results are normal. Stool examination finds no ova or parasites. Pleural fluid drainage yields approximately 400 mL of purulent fluid daily. Microbiological studies report that the pleural fluid culture is pending, and the initial smear is negative for acid-fast bacilli. Molecular Testing for TB(Xpert MTB/RIF) is negative.

4 Treatment

The patient was initially managed with vancomycin and ceftazidime for two weeks, along with chest tube drainage. Due to a lack of improvement, anti-tuberculosis medication,Isoniazid (INH),Rifampin (RIF),Ethambutol (EMB),Pyrazinamide (PZA) together with pyridoxin was subsequently added to her treatment regimen. Upon the accidental discovery of *Ascaris lumbricoides* in the pleural fluid, she was treated with albendazole at a dosage of 400 mg orally daily for 3 days.

5 Outcome and follow-up

She was initially given intravenous vancomycin and ceftazidime for the diagnosis of pneumonia with parapneumonic effusion. A chest tube was placed to drain the pleural effusion since she was having severe respiratory distress. After examination of the pleural fluid aspirate, the diagnosis of empyema was entertained when the findings showed increased white blood cell count with neutrophile predominance with a purulent pleural fluid aspirate.

Even though she was receiving a two weeks of broad-spectrum antibiotics,

chest tube drainage, and intra-nasal oxygen, her clinical condition was not improved. She continued to experience persistent fever, increasing respiratory distress, and worsening cough. Follow-up imaging studies, including a chest ultrasound showed the presence of loculated pleural effusions, raising concerns for more complex underlying pathology, including potential atypical infections such as tuberculosis. Since she was having contact with a patient diagnosed with pulmonary tuberculosis and the disease is endemic in the region together with symptom complex of tuberculosis, she started taking anti-tuberculosis medications (Figs. 1, 2 and 3).

While being managed on the 26th day of admission, multiple worms of Ascaris were discovered accidentally while it was draining through the chest tube. A multiple of worms was drained for two consecutive days: the largest measures



Fig. 1 Specimen of *Ascaris lumbricoides* extracted via chest tube, highlighting a case of ascariasis with associated pulmonary complications in the context of the patient's respiratory and gastrointestinal history



Fig. 2 Specimen of *Ascaris lumbricoides* extracted via chest tube, highlighting a case of ascariasis with associated pulmonary complications in the context of the patient's respiratory and gastrointestinal history

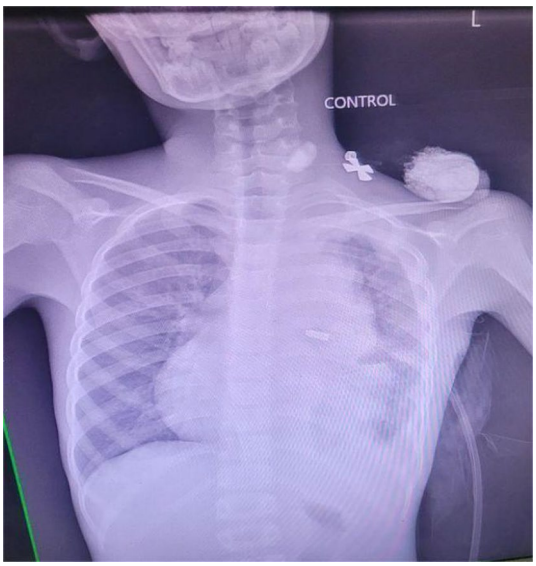


Fig. 3 Chest X-ray taken during the extraction of *Ascaris lumbricoides* via chest tube, demonstrating a massive left-sided pleural effusion

15 cm, and the smallest measures 10 cm. A total of 4 cans of worms were drained. After this accidental finding, the diagnosis of pulmonary ascariasis was added, and she started 400 mg of albendazole oral daily to be taken for 3 consecutive days. Concomitantly, a stool examination was sent, and it showed ova of ascaris lumbricodes.

She continued taking anti-TB medication, the endemic nature of the disease, and her contact history.

After taking the total dose of albendazole, she gradually improved her respiratory symptoms. The fever subsided, and she reported a decrease in cough intensity. Repeat imaging studies revealed a significant reduction in pleural effusion volume, indicating adequate drainage and resolution of the empyema. After several days of stable clinical status and adequate fluid output, the chest tube was successfully removed. Microbiological Investigations Update Pleural fluid culture results, which were initially pending, later confirmed the absence of bacterial growth,

Acid-fast bacilli (AFB) smear and culture results for tuberculosis remained negative.

6 Current status of the patient

Today is her 36th day of admission, the patient is afebrile, exhibiting stable vital signs with a heart rate of 72 beats per minute, respiratory rate of 16 breaths per minute, and oxygen saturation consistently above 95% on room air. There are no signs of respiratory distress, and she is able to engage in activities of daily living without significant exertion.

The patient's cough has markedly improved, with a noticeable reduction in sputum production. Auscultation of the lungs reveals clear breathsounds bilaterally, and there are no abnormal lung sounds such as wheezing or crackles. The

chest tube has been removed following a successful drainage period, and follow-up imaging studies have confirmed the significant reduction in pleural effusion volume, indicating effective resolution of the empyema.

Currently, she continues to receive supportive care, including hydration and nutritional support, to aid her recovery. The patient is on a comprehensive treatment regimen for pulmonary tuberculosis, which includes isoniazid, rifampin, pyrazinamide, ethambutol, and pyridoxin. She is tolerating the anti-TB medications well, with no reported side effects.

Follow-up stool analyses are scheduled to confirm the resolution of the ascariasis and repeat imaging studies will be conducted in two weeks to assess the status of her pulmonary health and ensure that there are no residual effusions.

7 Discussion and conclusions

This case underscores the critical importance of maintaining a high index of suspicion for coexisting infections in pediatric patients presenting with respiratory symptoms and pleural effusion. In clinical practice, respiratory symptoms in children are often attributed to common viral or bacterial infections, which may lead to overlooking less common etiologies. The identification of *Ascaris lumbricoides* in the pleural fluid of our patient is particularly notable due to its rarity and emphasizes the need for heightened vigilance, especially in endemic regions where parasitic infections are prevalent.

Ascaris lumbricoides, a soil-transmitted helminth, can cause a range of clinical manifestations, including respiratory symptoms associated with larval migration through the lungs. The entry of an adult *Ascaris lumbricoides* worm into the pleural space is highly unusual and suggests several potential pathways of migration. These include hematogenous spread, where Ascaris larvae penetrate the intestinal wall, enter the bloodstream, and reach the lungs, possibly extending to the pleural space. Another explanation is direct migration, wherein adult worms ascend from the gastrointestinal tract to the respiratory system through the trachea and bronchi, potentially leading to complications such as pneumothorax or pleural effusion. Additionally, pre-existing weakness or trauma to the pleural membrane may facilitate worm invasion into the pleural cavity. Rarely, medical or surgical interventions involving the thoracic cavity might inadvertently introduce the worm into the pleural space [2–4, 7–9].

In regions where ascariasis is endemic, clinicians should consider parasitic infections when evaluating patients with unexplained respiratory symptoms and pleural effusion. The overlap between parasitic infections and other infectious agents, such as Mycobacterium tuberculosis, can complicate the clinical picture. This emphasizes the need for thorough diagnostic evaluations, including imaging studies and laboratory tests, to distinguish between potential causes [5, 14–16].

7.1 Management approach

The management of this case required a multifaceted approach to effectively address both pulmonary tuberculosis and ascariasis. The initiation of a comprehensive anti-tuberculosis regimen—comprising isoniazid, rifampin, pyrazinamide, and ethambutol—was critical for treating the underlying tuberculosis infection. Concurrently, the administration of albendazole was necessary to target the Ascaris infection. This dual treatment strategy highlights the need for an integrated approach to managing coexisting infectious agents while providing supportive measures to enhance the patient's recovery [3, 10–12].

7.2 Impact on clinical practice

This case has significant implications for the clinical evaluation of pleural effusion of unknown origin, especially in regions where tuberculosis and parasitic infections are prevalent. The incidental discovery of *Ascaris lumbricoides* in the pleural fluid underscores the importance of including parasitic infections in the differential diagnosis when patients fail to respond to standard treatments for bacterial or tuberculous infections.

7.3 Broadening the differential diagnosis

In endemic areas, clinicians should maintain a high index of suspicion for parasitic infections, even when pleural effusion is initially attributed to more common causes such as tuberculosis or bacterial pneumonia. This case demonstrates the importance of a thorough diagnostic workup, which may include parasitological evaluations such as stool examinations or pleural fluid analysis for parasites.

7.4 Empirical anti-parasitic therapy

Empirical anti-parasitic therapy could be considered for patients with pleural effusion of unknown origin in endemic regions, particularly when there is a lack of response to standard treatments. The administration of albendazole or other anti-helminthic agents might be warranted in such cases, but empirical treatments should be approached with caution and guided by local epidemiological data and clinical judgment to prevent unnecessary side effects and potential drug resistance [14–16].

7.5 Screening for parasitic infections in TB-endemic areas

In TB-endemic regions, screening for parasitic infections should be considered in patients diagnosed with tuberculosis, particularly in those presenting with atypical symptoms or showing a poor response to anti-tuberculous therapy. Stool examinations for ova and parasites, as well as serological tests for common helminths, may aid in early detection and treatment, preventing complications and improving overall patient outcomes [8, 13, 16].

7.6 Comparison with previous reports

This case is notable for the delayed discovery of *Ascaris lumbricoides* in the pleural fluid and the co-existing tuberculosis infection. Pulmonary ascariasis is a rare manifestation of *Ascaris lumbricoides* infection, with most cases presenting gastrointestinal symptoms. Few similar cases have been reported in the literature.

- Rarity of Pulmonary Ascariasis: Pulmonary ascariasis is an uncommon complication of *Ascaris lumbricoides* infection, with respiratory involvement rarely documented. A review by Mewara et al. [3] identified extra-intestinal complications as infrequent, further emphasizing the uniqueness of this case.
- Co-Existing Tuberculosis: The co-existence of tuberculosis and parasitic infections presents a complex scenario requiring thorough investigation. Similar cases in endemic regions highlight the need for heightened awareness of potential co-infections.
- Delayed Discovery: The late diagnosis of pulmonary ascariasis in this case highlights the importance of considering parasitic infections even in advanced stages of pleural effusion.

7.7 Supportive care and patient education

Supportive care was crucial in managing this patient, encompassing hydration, nutrition, and monitoring for complications. Addressing the psychological impact of a complex illness is also essential, particularly in pediatric patients, and providing psychological support services aids in coping with hospitalization stressors. Patient and caregiver education regarding medication adherence and the nature of infections being treated plays a vital role in promoting compliance, especially in tuberculosis cases, to prevent drug resistance and achieve successful outcomes [4, 5, 11–13].

8 Conclusion

This case serves as a reminder to healthcare providers about the potential for coexisting infections in pediatric patients with respiratory symptoms and pleural effusion. It underscores the need for comprehensive diagnostic evaluations and a coordinated management approach that addresses multiple infectious agents while providing supportive care. Continued education and awareness of endemic infections like ascariasis are critical for improving clinical outcomes. Future research should aim to better understand the interplay between infectious agents and develop guidelines for managing pediatric patients effectively.

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Author contributions Dr. Misganaw Ayenew Amogne, A corresponding author, Conceptualized the case report, conducted the literature review, drafted, edited, and reviewed the manuscript. Responsible for communication with the journal and handling revisions, as well as managing the overall team efforts. 1. Dr. Yabibal Tsegaye Workineh was involved in direct patient care, follow-up, and documentation of case reports as well as writing. 2. Dr. Tamirat Werash Hailu contributed to the review and editing of the case report 3. Dr. Temesgen Tamiru Tadese contributed to the review and editing of the case report. 4. Dr. Muluken Getinet Mekuriaw wes members of the patient management team and contributed to the review and editing of the case report. 5. Dr. Dagimawi Abiy Abate wes members of the patient management team and contributed to the review and editing of the case report. 6. Dr. Marshet Mulugeta Yihyes contributed to the review and editing of the case report.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical considerations, access to the raw data will be granted only after a formal request is made, and appropriate measures will be taken to ensure that participant confidentiality is maintained.

Declarations

Ethics approval and consent to participate This research study was designed in accordance with ethical guidelines to ensure the protection of participants' rights and welfare. Prior to the commencement of the study, ethical approval had been obtained from the Ethics Committee of Debre Markos University. All potential participants were provided with an Informed Consent Form outlining the purpose of the research, procedures involved, potential risks and benefits, and measures taken to ensure confidentiality..

Consent for publication In accordance with ethical guidelines and institutional policies, informed consent was obtained from the patient's father. The father was provided with detailed information about the study, including its purpose, procedures, potential risks, and benefits. He voluntarily consented to the patient's participation in the study as well as to the publication of related findings.

Competing interests The authors declare no competing interests.

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