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Detection of Live Strongyloides Larvae in Bronchoalveolar Lavage of a Renal Transplant Recipient: A Case Report

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Case Report
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Abstract

Strongyloidiasis is an opportunistic parasitic infection that can cause life-threatening hyperinfection in immunocompromised patients. We report a case of a 36-year-old renal allograft recipient who developed gastrointestinal symptoms and progressive respiratory failure approximately four weeks post-transplantation. Direct wet-mount microscopy of bronchoalveolar lavage (BAL) revealed numerous live, motile Strongyloides larvae. Pre-transplant screening records for the recipient and donor were unavailable. Despite intensive supportive care measures, the patient succumbed to fulminant infection. This case highlights the importance of pre-transplant risk assessment and Strongyloides screening in both renal transplant recipients and donors, and the diagnostic value of direct microscopy when hyperinfection is suspected.

Keywords: Strongyloides Stercoralis; Renal Transplantation; Hyperinfection; Pulmonary Strongyloidiasis; Bronchoalveolar Lavage; Nematode Larvae; Pre-Transplant Screening

Abbreviations

BAL: Bronchoalveolar Lavage; NDM: New Delhi Metallo-Beta-Lactamase; PCR: Polymerase Chain Reaction; CDC: Centre for Disease Control; AST: American Society of Transplantation.

Introduction

A soil-transmitted intestinal nematode, *Strongyloides stercoralis*, can persist in humans through autoinoculation. In immunocompetent individuals, infection may remain asymptomatic or cause nonspecific gastrointestinal or cutaneous symptoms. Immunosuppression, particularly corticosteroid exposure, can accelerate autoinfection and lead to hyperinfection syndrome or disseminated disease. Solid-organ transplant recipients are at particular risk because immunosuppressive therapy may convert previously unrecognized chronic infection into severe disease. Strongyloides infection may be acquired before transplantation and subsequently reactivate, or, less commonly, may be transmitted from an infected donor. Current transplant guidance supports risk-based screening of transplant candidates and donors with relevant epidemiological exposure, with Strongyloides serology generally preferred as a screening test [1-4]. The clinical manifestations of hyperinfection are often nonspecific. Gastrointestinal symptoms may precede pulmonary disease, while radiological findings can mimic bacterial, viral, fungal, or other opportunistic infections. Eosinophilia may be absent in severely immunosuppressed patients. Direct demonstration of larvae in respiratory specimens can therefore provide an important diagnostic clue [2,5]. We report a renal allograft

recipient who developed gastrointestinal and pulmonary illness shortly after transplantation. A wet mount microscopic examination of the BAL fluid showed multiple live, motile parasitic larvae of *Strongyloides*. The case emphasizes the value of pre-transplant screening and the necessity of continued clinical monitoring following transplantation.

Case Presentation

A 36-year-old male patient with hypertension, diabetes mellitus, and chronic kidney disease secondary to IgA nephropathy underwent renal transplantation at another facility. His wife was the living donor. The patient had been transplanted at another facility, and the referral records contained no information on birthplace, previous residence, travel, or soil exposure. After the transplantation, he was kept on prednisolone 17.5 mg once daily, tacrolimus 3 mg twice daily, and mycophenolic acid 720 mg twice daily. Approximately four weeks after transplantation, he presented a three-day history of abdominal pain, abdominal distension, constipation, and obstipation. Abdominal imaging demonstrated diffuse dilatation of the jejunal and proximal ileal loops with multiple air-fluid levels. A proximal ileal loop adjacent to the transplant bed showed features suggestive of intestinal obstruction. Diffuse long-segment mural thickening of the jejunal loops was also noted, with infective, inflammatory, and oedematous wall changes included in the differential diagnosis (Figure 1). Laboratory investigations (Table 1) showed severe anaemia (haemoglobin 7.1 g/dL), neutrophilia (91%) with a normal total leucocyte count (7.6 × 10^3/μL), profound lymphopenia (absolute lymphocyte count 0.23 × 10^3/μL), markedly raised C-reactive protein (267 mg/L), and no eosinophilia. Within approximately 24 hours, blood urea rose from 72 to 114 mg/dL and serum creatinine from 0.95 to 1.58 mg/dL, a 1.66-fold increase consistent with acute kidney injury.



Figure 1: Chest computed tomography showing diffuse bilateral ground-glass opacities with nodular interstitial thickening involving all lobes.

The patient subsequently developed progressive respiratory distress and hypoxaemia requiring intensive care. Diffuse bilateral ground-glass opacities with nodular interstitial thickening affecting all lobes were seen on chest computed tomography. In view of recent transplantation, substantial immunosuppression, and progressive pulmonary infiltrates, an opportunistic infection was suspected. Bronchoscopy was performed and approximately 20 mL of reddish, slightly turbid BAL fluid was received in the microbiology laboratory. Direct wet-mount examination of the BAL fluid revealed numerous live, slender, actively motile Strongyloides larvae (Figure 2). Based on the detection of live actively motile strongyloides larvae in BAL fluid, and the clinical setting of recent renal transplantation with gastrointestinal symptoms followed by pulmonary deterioration, the findings were considered consistent with Strongyloides species and supportive of pulmonary strongyloidiasis with presumed hyperinfection. Species-level molecular confirmation was not available.

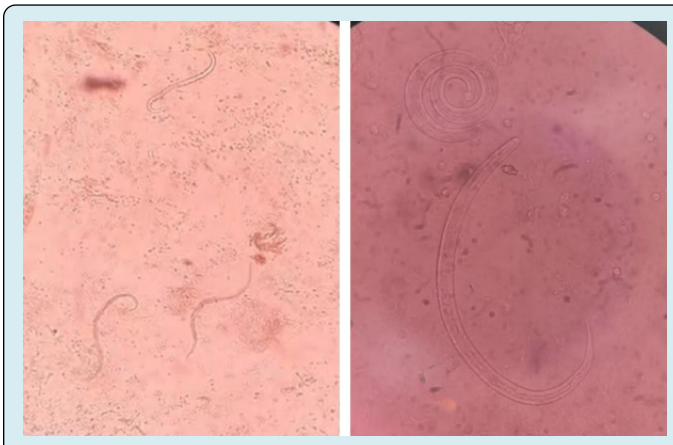


Figure 2: Wet mount bronchoalveolar lavage examination under light microscope shows larvae of Strongyloides.

Bronchoalveolar lavage PCR testing for respiratory viruses, cytomegalovirus, Epstein-Barr virus, Mycobacterium

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tuberculosis, mucormycosis, and aspergillosis was negative. NDM-producing Klebsiella pneumoniae were isolated in blood and BAL cultures. The absence of eosinophilia did not exclude the diagnosis, given the patient's substantial immunosuppression and severe disease. Intensive supportive care and broad-spectrum antimicrobial therapy was started to the patient with intravenous ganciclovir (5 mg/kg every 12 h during induction, infused over 1 h), meropenem (2 g every 8 h, as a 3-h prolonged infusion), teicoplanin (12 mg/kg every 12 h for three loading doses, then 12 mg/kg every 24 h), metronidazole (500 mg every 8 h), fluconazole (800 mg loading dose, then 400 mg every 24 h), and trimethoprim–sulfamethoxazole (10–15 mg/kg/day based on the trimethoprim component, divided every 8–12 h) was also administered. The dosage of mycophenolic acid was lowered to 360 mg twice daily, and 100 mg of hydrocortisone was given intravenously every six hours. Ceftazidime-avibactam (2.5 g intravenously every 8 hours) and aztreonam (2 g intravenously every 8 hours) were the next step in the escalation of antibiotics. Ivermectin-based antiparasitic therapy was not documented. The patient gradually declined and succumbed to fulminant infection in spite of supportive care and antimicrobial therapy. The concurrent NDM-producing Klebsiella pneumoniae infection represents an additional potentially life-threatening diagnosis. Therefore, the fatal outcome cannot be attributed exclusively to strongyloidiasis; bacterial pneumonia and bacteraemia may have contributed independently or synergistically to the clinical deterioration.

Parameter	Result	Reference interval
Hemoglobin	7.1 g/dL	13.0–17.0 g/dL
Total leucocyte count	7.6×10^3/μL	4.0–11.0/μL
Neutrophils	91%	40–70%
Absolute lymphocyte count	0.23×10^3/μL	1.0–3.0/μL
C-reactive protein	267 mg/L	<5 mg/L
Blood urea (admission to 24 h)	72 → 114 mg/dL	15–40 mg/dL
Serum creatinine (admission to 24 h)	0.95 → 1.58 mg/dL	0.6–1.3 mg/Dl

Table 1: Selected laboratory findings at presentation.

Discussion

This case demonstrates severe Strongyloides infection occurring soon after renal transplantation, with gastrointestinal manifestations followed by pulmonary involvement and respiratory failure. The most striking microbiological finding was the direct demonstration of numerous viable, actively motile nematode larvae in BAL fluid. Strongyloides hyperinfection results from accelerated autoinfection in the setting of impaired host immunity. Gastrointestinal involvement may be present with abdominal pain, distension, diarrhoea, constipation, ileus, or other nonspecific manifestations. Pulmonary involvement can produce diffuse infiltrates and respiratory failure. Because these manifestations overlap with postoperative complications and opportunistic infections, the diagnosis may be delayed [2,5]. In this patient, the progression from gastrointestinal symptoms to pulmonary disease, together with the abundance of larvae in BAL fluid, strongly supports hyperinfection with pulmonary involvement. The available information does not establish extrapulmonary dissemination beyond the gastrointestinal-pulmonary pathway. The concurrent isolation of NDM-producing Klebsiella pneumoniae is also clinically relevant. Strongyloides hyperinfection can facilitate translocation of enteric Gram-negative bacteria across damaged intestinal mucosa [2,3]. In this case, however, the bacterial infection should be regarded as a concurrent serious infection and a potential contributor to the outcome. The lack of documented pre-transplant Strongyloides screening for both the recipient and the donor is the primary preventable issue identified by this case. Current AST guidelines advise risk-based evaluation of transplant candidates and donors, especially when there is epidemiological exposure to Strongyloides. The South Asian Transplant Infectious Disease Guidelines specifically address strongyloidiasis among endemic infections relevant to solid-organ transplantation and emphasize screening in appropriate candidates and donors [1,3,4]. Pre-transplant assessment should include a careful epidemiological history, including country or region of origin, previous residence, travel to endemic areas, occupational or recreational soil exposure, and sanitation-related exposure. In individuals at risk, Strongyloides IgG serology is generally preferred for screening, while stool-based microscopy, concentration/culture methods, or molecular testing may be used as complementary investigations [1,3,4].

An important limitation is that neither recipient nor donor Strongyloides testing was documented in this case. Therefore, the source of infection cannot be established

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retrospectively. Previously unrecognized recipient infection with post-transplant hyperinfection is plausible, while donor-derived transmission cannot be excluded.

The short interval of approximately four weeks between transplantation and clinical deterioration is compatible with rapid progression of previously existing infection; however, without pre-transplant testing, donor-derived infection cannot be definitively excluded. This uncertainty itself reinforces the importance of systematic screening and documentation. The diagnosis in this patient was made through direct examination of BAL fluid. Direct visualization of live, motile larvae in a respiratory specimen can provide a rapid and clinically meaningful clue in severe Strongyloides infection. Respiratory specimens may be particularly useful when stool examinations are negative or unavailable, although stool-based testing and serology remain important components of diagnostic evaluation [2,5]. The patient had no eosinophilia despite severe infection. This is not unexpected in immunosuppressed patients. Corticosteroids and severe disease may suppress the eosinophilic response. Therefore, among transplant patients, the lack of eosinophilia should not be utilized to rule out Strongyloides infection [2,3]. Strongyloidiasis is best treated with ivermectin. For uncomplicated infections, CDC guidelines suggest taking 200 µg/kg of ivermectin orally for one to two days. For hyperinfections, daily treatment is necessary until stool and/or sputum tests are negative for two weeks [6]. In patients with ileus, obstruction, or impaired absorption, alternative routes have been described in published experience. In the present case, ivermectin administration was not documented. The case underscores that once hyperinfection is suspected, antiparasitic therapy should be initiated promptly while diagnostic investigations and management of concurrent infections continue [6]. The most important preventive strategy is recognition and treatment of Strongyloides infection before immunosuppression becomes established. For transplant programmes serving populations with relevant epidemiological exposure, incorporation of Strongyloides risk assessment and appropriate screening into the pre-transplant infectious-disease evaluation may prevent severe post-transplant disease [7-10]. This strategy is especially crucial in South Asia, where exposure to soil-transmitted diseases is prevalent. Strongyloidiasis is one of the parasite illnesses that should be taken into consideration in the 2023 South Asian Transplant Infectious Disease Guidelines, which offer region-specific advice for solid-organ transplant candidates, recipients, and donors [4]. This case therefore illustrates a preventable sequence: an apparently unrecognized infection in a transplant recipient, profound post-transplant immunosuppression, gastrointestinal manifestations, pulmonary hyperinfection, detection of larvae in BAL, and fatal clinical deterioration.

Conclusion

Strongyloides hyperinfection is an immunosuppressive condition that can be fatal after solid organ transplantation. In this renal transplant recipient, gastrointestinal manifestations were followed by pulmonary deterioration, and numerous live, motile nematode larvae were detected directly in BAL fluid. The principal preventable issue was the absence of documented pre-transplant Strongyloides screening of both recipient and donor. Transplant programmes should incorporate epidemiological risk assessment and appropriate Strongyloides testing into pre-transplant evaluation of candidates and donors with relevant exposure. For microbiology laboratories, careful direct microscopic examination of respiratory specimens remains valuable when hyperinfection is suspected. In a transplant recipient with unexplained gastrointestinal symptoms followed by pulmonary disease, particularly in the presence of Gram-negative bacteraemia, Strongyloides should be considered promptly even when eosinophilia is absent.

Declarations

Conflict of interest: The authors declare no competing interests.
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