

When a Larva Migrates...

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Abstract

Toxocariasis is a frequent zoonosis in the pediatric population, yet usually neglected. Clinical findings are vast and may cause serious complications. The authors present a case of a 23-month-old boy diagnosed with a lobar pneumonia due to fever, cough, and a heterogeneous opacity in the right apex. Laboratory evaluation pointed out eosinophilia and iron-deficiency anemia. Dietary errors, an eating behavior disorder (geophagia), and frequent contact with dogs were also identified. Parasitic infections studies were carried out, with positive *Toxocara* spp. antibodies. Due to the nonspecificity of the clinic manifestations, it is necessary to have a high level of suspicion to make the diagnosis of toxocariasis. Treatment with antiparasitic drugs should be weighed against clinical severity. The prevention of infection should be a priority. The etiological investigation of eosinophilia in the pediatric age should include parasitic infections.

Keywords: Anemia, Iron-Deficiency/complications; Eosinophilia/etiology; Infant; Larva Migrans, Visceral/diagnosis; Lung Diseases, Parasitic/diagnosis; Pica/complications; Toxocariasis/diagnosis; Toxocariasis/therapy

Introduction

Toxocariasis – also known as *larva migrans* – is a frequent yet neglected zoonosis in pediatric population.^{1,2} This infection is more common in tropical and rural regions but its seroprevalence is considerably high in developed countries.^{3,4} This disease is more frequently caused by infection from the helminth *Toxocara canis* (from dogs), or less commonly from *Toxocara cati* (from cats).³ Humans are accidental hosts and acquire the infection after the ingestion of the parasites eggs from contaminated soil with dog or cat feces.^{2,3} Although less frequently, transmission can also occur after eating contaminated

undercooked meat.^{2,3} After ingestion, the eggs hatch and larvae penetrate the intestinal wall, migrating to a variety of tissues. In definitive hosts, the larvae continue their development and reach again the intestinal lumen to be shed in the stool. In humans, larvae do not mature and their presence and death in the tissues creates an inflammatory reaction – an eosinophilic granulomatous response – that causes the clinical findings of the disease. They can remain encapsulated in the tissues for years and reactivate later.²⁻⁶

Children are more frequently infected due to behavioral risk factors, such as playing in playgrounds with sand and worse hygiene habits.^{3,4}

Clinical manifestations are dependent on which tissues the immune reaction occurs and range widely from asymptomatic to severe forms. There are two major types of toxocariasis – visceral and ocular – and both can coexist. Visceral toxocariasis usually occurs in younger children. The main sites of invasion are lungs and liver, but any organ can be affected, with its specific symptoms and signs. Pulmonary involvement may cause cough, wheezing, and respiratory effort. Liver involvement may lead to hepatomegaly and nodular lesions. Cardiac infection may result in endocarditis, myocarditis, or pericarditis. The effect on the central nervous system may cause meningoencephalitis, myelitis, or vasculitis, among others.³ Ocular toxocariasis is a disease of older children and adolescents, with granulomatous reaction in the eye and visual impairment.³ It is essential to diagnose the disease as soon as possible because larva migration to noble organs may lead to serious complications.^{2,3,5}

Toxocariasis is a challenge to diagnose and should be suspected when clinical manifestations are associated with laboratory findings such as leukocytosis with eosinophilia and hypergammaglobulinemia (elevated immunoglobulins M, G, and E).^{2,3} Diagnosis is reinforced by enzyme-linked immunosorbent assay (ELISA) although a positive test does not necessarily mean active infection.² This should be confirmed by the western blot technique.³ Stool tests are not helpful since the parasite is not shed in human feces.^{2,3} There are no

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consensual guidelines for treatment, related with the absence of randomized controlled trials. Anthelmintic therapy with a benzimidazole, typically albendazole, is the most recommended option.^{2,3,5}

Case Report

A previously healthy 23-month-old boy was admitted to the emergency department with a five-day history of cough and fever. On admission, he was in good general condition with no respiratory distress. Pulmonary auscultation revealed diminished breath sounds at the right apex and a chest X-ray showed heterogeneous opacity in the same region (Fig. 1). The diagnosis of a lobar pneumonia was assumed, and he was treated with oral amoxicillin (100 mg/kg/day) for seven days, with clinical resolution. Laboratory evaluation at this time pointed out leukocytosis (26.6×10^9 cells/L) with 23% (6.12×10^9 cells/L) of neutrophils, 33% of lymphocytes and 40% (10.64×10^9 cells/L) of eosinophils. C-reactive protein (CRP) of 12.7 mg/dL, hemoglobin of 8.9 g/dL, with mean corpuscular volume (MCV) 69.3 fL, mean corpuscular hemoglobin concentration (MCHC) 298 g/L and red cell distribution width (RDW) 17.5%.

Further investigation confirmed an iron-deficiency anemia, with decreased ferritin (11 ng/mL), which was caused by multiple dietary errors (excessive milk drinking and low intake of heme-containing food, like meat and fish, due to a restrictive dietary disturbance). In addition, he had geophagia, an eating behavior disorder. The patient also had close contact with dogs, which he played with in the garden. In subsequent evaluations, persistent and severe eosinophilia (maximum 13.97×10^9 cells/L) became evident, without symptoms of atopy or the administration of any medicine. He did not travel to any other country in previous months. As a parasitic infection is the leading cause of eosinophilia in children and no other causes like drug hypersensitivity or atopic disease were found, studies were conducted to explore it first. Stools examination were performed and negative. Because of its prevalence and based on clinical history (geophagia and frequent contact with dogs), a serologic test for *Toxocara* spp. was required and positive by ELISA technique, confirmed by western blot. Increased immunoglobulins G (4,034 mg/dL) and E (2,997 mg/dL) were too consistent with the diagnosis of toxocariasis. Because of these findings no further investigation was made. He was treated with antiparasitic drug (albendazole 400 mg twice a day, for five days) and iron supplements (5 mg/kg/day). Dietary errors were corrected.



Figure 1. Chest X-ray, postero-anterior view. Heterogeneous opacity at the right apex (*).

During follow-ups, he was always asymptomatic. Control laboratory evaluations were done after one month of therapy and then regularly until the complete normalization of both eosinophilia and anemia. A control chest X-ray showed the resolution of the lung opacity. A serologic test for *Toxocara* spp. was not repeated. The family was advised to deworm their pets.

Discussion

This case reminds us that toxocariasis also exists in developed countries. Due to unspecific clinical manifestations, a high level of suspicion is necessary to make the diagnosis, so we must be aware of the disease. Despite the positive *Toxocara* serology, we still have doubts about the clinical and radiological findings. Were they truly pneumonia or an immunologic reaction to the larvae in pulmonary tissue? Was eosinophilia an incidental finding in the middle of a bacterial infection process? We can conjecture that a high C-reactive protein level suggests a bacterial cause for this clinical condition. Probably only a lung biopsy at the time would have answered these questions. However, being an invasive technique is not reasonable to use it in daily practice. Imaging studies like computerized tomography or nuclear magnetic resonance could also have led us to some answers, despite their lack of specificity. Treatment with antiparasitic drugs should be weighed against clinical severity because an immune reaction to dead larvae may worsen the symptoms. Some authors consider that asymptomatic or mild infections should not be treated, as they are self-limited.^{2,3} However, untreated infections may imply the presence of larvae encysted in tissues for years, with the possibility of later reactivation and migration to noble organs.⁶ In these cases, the clinical condition can be much worse than the primary infection. In the authors' opinion, despite clinical improvement, the persistent severe eosinophilia

in a confirmed *Toxocara* infection and the risks of reactivation justified treatment with the antiparasitic drug. A serologic test for *Toxocara* was not repeated because immunoglobulin G decreases very slowly and, therefore, it is not a good follow up instrument, and monitoring eosinophilia should be prioritized.³

According to the clinical history, we assume that the precipitating factor to the parasitic infection was the iron-deficiency anemia that motivated an eating behavior disorder. Geophagia, in particular, is an additional risk factor for the transmission of the parasite as ingestion of soil contaminated with feces is the main route of infection, as described hereinabove. Furthermore, the frequent contact with dogs potentiated the transmission. It is important to bear in mind that the etiological investigation of eosinophilia in pediatric age should always include parasitic infections, considering their frequency. The prevention of toxocariasis should be a priority and should address better hygiene habits, animal deworming, and avoidance of animals on playgrounds. As we saw in this case, dietary errors can be a risk factor for developing eating disorders that can potentially lead to infections like toxocariasis. Therefore, it is essential to correct them. In conclusion, we should be alert to this clinical entity so that the diagnosis can be considered.

WHAT THIS CASE REPORT ADDS

- Toxocariasis is a frequent infection, especially in the pediatric age due to behavioral risk factors.
- Clinical manifestations have a wide range from asymptomatic to severe forms, depending on which tissues the immune reaction occurs.
- Eosinophilia should suggest a parasitic infection investigation.
- Treatment with antiparasitic drugs should be weighed against clinical severity.
- Due to unspecific clinical manifestations, a high level of suspicion is necessary to make the diagnosis.

Conflicts of Interest

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Confidentiality of data

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Quando uma Larva Migra...

Resumo

A toxocaríase é uma zoonose frequente em pediatria, apesar de pouco valorizada. O espectro clínico é amplo e pode associar-se a complicações graves. Os autores apresentam o caso clínico de um menino de 23 meses, diagnosticado com uma pneumonia lobar por febre, tosse e uma hipotransparência heterogénea no ápex pulmonar direito. Da avaliação analítica salientava-se eosinofilia e anemia ferropénica. Identificados erros alimentares, distúrbio do comportamento alimentar (geofagia) e contacto frequente com cães. Estudos parasitológicos foram realizados, identificando-se anticorpos positivos para *Toxocara* spp.

Pela inespecificidade das manifestações clínicas é necessário um elevado grau de suspeição para o diagnóstico de toxocaríase. O tratamento com antiparasitários tem de ser ponderado face à gravidade clínica. A prevenção da doença deve ser a prioridade. A investigação etiológica da eosinofilia na idade pediátrica deve incluir as infeções parasitárias.

Palavras-Chave: Anemia por Deficiência de Ferro/complicações; Eosinofilia/etiologia; Geofagia/complicações; Lactente; Larva Migrans/diagnóstico; Pneumopatias Parasitárias/diagnóstico; Toxocaríase/diagnóstico; Toxocaríase/tratamento farmacológico