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Toxocara related peritonitis: A case report and review of literature

Ferhat Arslan[a,*], Naciye Betul Baysal[a], Ahmet Aslan[b], Bengu Cobanoglu Simsek[c], Haluk Vahaboglu[a]

[a] Department of Infectious Diseases, Göztepe Training and Research Hospital, Istanbul Medeniyet University, Dumlupınar Mahallesi, D100 No:98, 34000 Kadıköy/İstanbul, Turkey
[b] Department of Radiology, Göztepe Training and Research Hospital, Istanbul Medeniyet University, Dumlupınar Mahallesi, D100 No:98, 34000 Kadıköy/İstanbul, Turkey
[c] Department of Pathology, Göztepe Training and Research Hospital, Istanbul Medeniyet University, Dumlupınar Mahallesi, D100 No:98, 34000 Kadıköy/İstanbul, Turkey

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ABSTRACT

Toxocariasis is a clinical syndrome caused by the larvae of two ascarid nematodes, namely, *Toxocara canis* and *T. cati* that live in dogs and cats as definitive hosts. Humans acquire Toxocara infection by accidental consumption of eggs contaminated foods, soil, water or larvae encapsulated in the viscera or meats of various paratenic hosts e.g., chicken. After oral ingestion, the ova hatch and the free larvae penetrate the intestinal wall to migrate to distant tissues throughout the body. Larvae may also infiltrate the intestinal wall and cause enteritis and mass occupying lesions. Here, we present a *T. canis* related gastroenteritis and peritonitis case successfully treated with albendazole. We reviewed the literature and found seven previously published Toxocara related peritonitis cases. To our knowledge, this is the first review about non-disseminated toxocariasis that restricted to the intestine and presented as eosinophilic ascites due to peritoneal inflammation. The most common abdominal symptoms were abdominal pain and nausea, and the most common findings were eosinophilic infiltrations on endoscopic biopsy specimens and eosinophilia in the peripheric blood samples.

1. Case report

Toxocariasis is a clinical syndrome caused by the larvae of two ascarid nematodes, namely, *Toxocara canis* and *T. cati* that live in dogs and cats as definitive hosts [1]. As a paratenic host, the ingestion of embryonated ova of *Toxocara* sp. from the soil, and/or contaminated unwashed/uncooked foods, and/or encysted larvae in the undercooked meat of an infected paratenic host, are the main routes for infection in humans. After oral ingestion, the ova hatch and the free larvae penetrate the intestinal wall to migrate to distant tissues throughout the body. Migrating juvenile larvae may cause two main syndromes, namely, visceral larvae migrans (VLM) and ocular larva migrans (OLM). The other rarely reported types of human toxocariasis include covert toxocariasis and neurotoxocariasis [1,2]. The severity of clinical disease is determined by the parasite burden, localization and the duration of larval migration, and the intensity of individual inflammatory responses [3,4]. Toxocara larvae migrate through the bowel wall and gain access to the portal venous circulation causing liver involvement. Granulomatous hepatitis may develop in the liver with eosinophilic infiltrates [5]. In the event that the parasite remains in the bowel wall, the clinical course may be altered from that of enteritis to that of intestinal mass lesions, which may be overlooked [6]. To our knowledge, there are only 7 available cases of *Toxocara*-related gastroenteritis complicated by ascites reported in the medical literature [7–13]. In this report, a brief review of the literature on well-documented cases of *Toxocara*-related peritonitis has also been presented after the case report.

A 29-year-old female patient presented to our department with a complaint of abdominal distention, for which an abdominal drainage catheter was inserted in the left lower quadrant at the outpatient clinic. She stated in her medical history that her symptoms started with anorexia, nausea, vomiting, stinging abdominal pain, and swelling in the abdomen, 1 month before. The patient had no fever or weight loss until her recent admission to hospital. Her past medical history was unremarkable. She had no history of high-risk sexual behavior, tobacco intake, alcohol abuse, use of illicit drugs, or contact with sick patients. She also had no contact with new pets or animals. However, she stated that she ate fish and salad in a restaurant 1 day before the first symptoms began. Initial physical examination revealed normal vital signs; except for an impaired resonance on percussion over the right basal region of the thorax and the abdomen, which were compatible with the presence of pleural effusion and ascites, respectively, she demonstrated

* Corresponding author.
E-mail address: ferhatarslandr@hotmail.com (F. Arslan).

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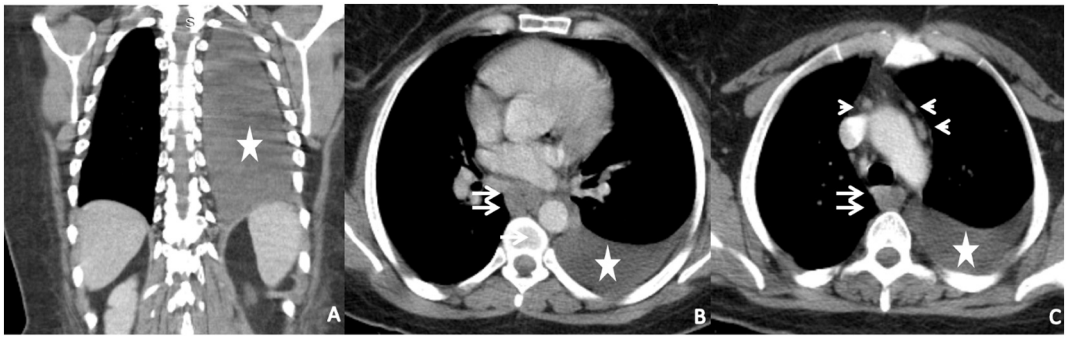

Fig. 1. Computed tomography of the thorax shows left-sided pleural effusion (star) (A-C), esophageal wall thickening (white arrows) (B, C), and enlarged mediastinal lymph nodes around the aortic arc (arrowheads) (C).

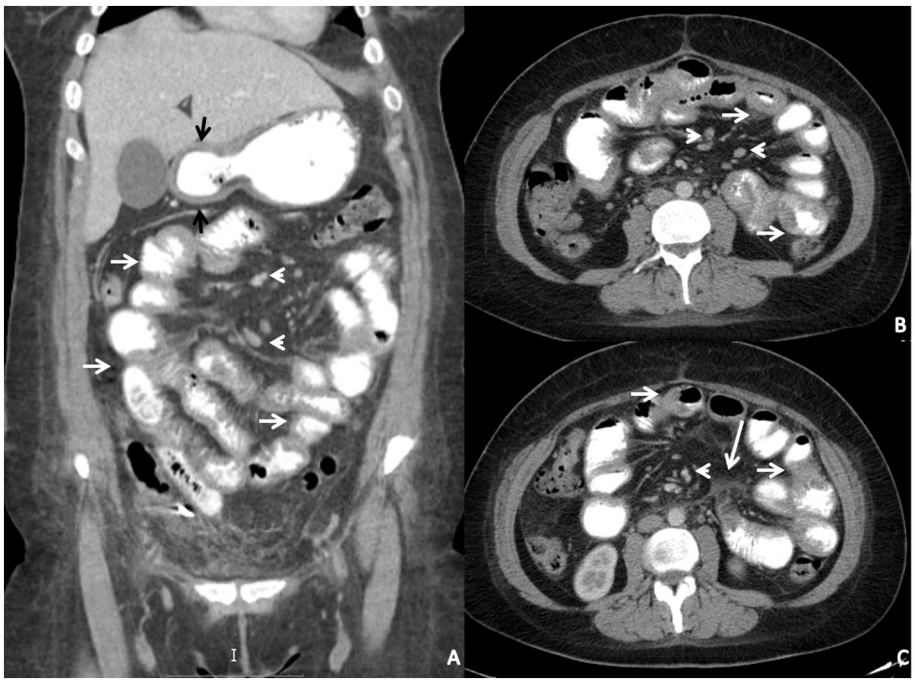

Fig. 2. Gastric (black arrows) (A) and small bowel wall (white arrows) (A-C) thickening with mesenteric (arrowheads) (A-C) and para-aortic lymph nodes seen on coronal (A) and axial (B, C) computed tomography images of the abdomen. A trace amount of free fluid is noted in the region of the mesentery (long white arrow) (C).

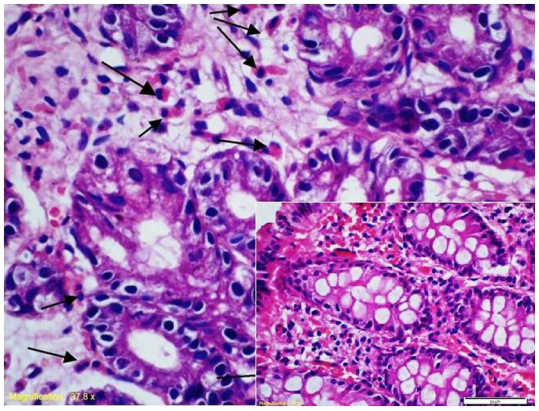

Fig. 3. (a,b) Markedly increased eosinophils in the lamina propria of the stomach and colon (> 20/high-power field [HPF]) on histopathology.

no significant findings on physical examination. Examination of the blood showed leukocytosis (16,100/mm^3 [range: 4.000–11.000/mm^3]) and absolute eosinophilia (9310/mm^3 [range: 0–500 /mm^3]). The erythrocyte sedimentation rate (2 mm/h [range: 0–20 mm/h], C-reactive protein (0.77 mg / dl [range: 0–5 mg/dl]), serum IgE level (57.9 [range: < 140 IU / ml]), and the biochemistry panel were within normal range.

The contrast-enhanced computed tomography (CT) of the thorax and abdomen revealed diffuse esophageal wall thickening, enlarged mediastinal lymph nodes, left-sided pleural effusion with subsegmental atelectasis of the inferior segment, mild intra-abdominal free fluid with mesenteric fat stranding, mild diffuse wall-thickening of the gastric antrum, dilatation of the jejunum and proximal ileum with mild wall thickening, and enlarged lymph nodes in the mesenteric and paraaortic regions (Figs. 1 and 2). The results of the peritoneal fluid cultures for aerobic and anaerobic bacteria were negative. The results of the Mycobacterial culture and polymerase chain reaction (PCR) were also negative. The cytopathological evaluation of ascites revealed lymphocytes, macrophages, and mesothelial cells. Esophagogastroduodenoscopy revealed the presence of pangastritis and an ulcer, 5 mm in diameter, covered with edematous, erythematous, and erosive mucosa in the duodenal bulb. Colonoscopy showed small, petechial, and erythematous lesions. The histopathologic assessments of both, the stomach and colon biopsies were compatible with that of eosinophilic mucosal inflammation (Figs. 3a and 3b). The patient developed fever on day 8 of admission. Microbiological studies of the ascitic fluid revealed

Table 1
Clinical, laboratory and prognostic features of toxocara related peritonitis cases.

Age/gender Reference	Sign and symptoms	Onset of disease before admission	Laboratory results	Radiological features	Endoscopic investigations and histopathological examination	Treatment
25 F [9]	Abdominal pain and distention, nausea, vomiting, ascites, diarrhea	28 days	Leukocyte count: 14 10^3/ul (%41 eosinophil) Paracentesis: 8640 Leukocyte with 94% eosinophils Total serum IgE: 849 U/mL Stool ova and parasite testing negative	Diffuse bowel wall thickening and distended loops of small bowel with extensive free peritoneal fluid on CT	Eosinophilic gastritis	Prednol (empirical therapy)[a] Albendazol (Targeted therapy)
47 M [11]	Massive ascites, nausea	60 days	Paracentesis: rare eosinophilic cells [b]	Moderate ascites on USG	Gastritis	Ascites reducing therapy (empirical therapy) Albendazol (Targeted therapy)
13 F [8]	Ascites, abdominal pain, weight loss	60 days	Leukocyte count:10.5 10^3/ul (%81 eosinophils) Paracentesis: 357 white blood cells/ mm3 (95% eosinophils) Stool ova and parasite testing negative AST:224 u/L, ALT:29u/L	Moderate ascites, and thickened gallbladder on CT	Not done	Albendazol (Targeted therapy)
17 F [7]	Ascites, abdominal pain, diarrhea, nausea, vomiting	7 day	Leukocyte count: 10.5 10^3/ul (%44 eosinophils) Paracentesis: 4500 cell/mm3(%90 eosinophils) Total IGE: 412 U1/ml Stool ova and parasite testing negative, AST: 78u/L ALT:60u/L	Thickened gastric wall on USG	Eosinophilic gastrit- duodenitis	Montelukast (empirical therapy) Albendazol (targeted therapy)
17 M [10]	Abdominal pain, nausea, vomiting, ascites, diarrhea, hydrothorax	NA	Leukocyte count: 11.5 10^3/ul (%60 eosinophils)	ELISA	Gastric mucosal erosion,- Eosinophilic colitis	Albendazol (targeted therapy)
27 M [12]	Diarrhea, epigastric burning, abdominal cramping, weight loss	NA	Leukocyte count (35,000/ mma, (59% eosinophils) Paracentesis: 5500 white blood cells/mm3 with 89% eosinophils	Ascite and ileitis on CT Edematous bowel wall on barium graphy	Eosinophilic gastritis, duodenitis, colitis	Albendazol (targeted therapy)
61 M [13]	Abdominal pain associated with food intolerance, diarrhea, bloating and weight gain	60 days	24,800 leukocytes/mm3 (66% eosinophils) Paracentesis: 30,000 white blood cells/ mm3 (90% eosinophils)	Small pleural effusion, moderate ascites and a concentric wall thickening of the gastric antrum and duodenal bulb on CT	Gastric mucosa with thickened folds, antrum and duodenal bulb with superficial erosions and petechial lesions/eosinophilic colitis	Methylprednisone 40 mg/day[a] (empirical therapy) Albendazol (targeted therapy)
29F,Present case	Abdominal pain, nausea, vomiting, ascites	30 days	Leukocyte count: 16.1 10^3/ul (%57.9 eosinophils) Paracentesis: Lymphocytes and macrophage cells Total IgE: 57.9	Mild wall thickening of gastric antrum, jejunum and proximal ileum, mesenteric and paraaortic enlarged lymph nodes	Eosinophilic gastritis, colitis	Nonspesific antibacterial therapy Albendazol (targeted therapy)

[a] Symptoms relieved after prednisolon therapy.
[b] Massive number of eosinophils were detected at two months ago.

a white blood cell (WBC) count of 960/mm^3. Gram-positive cocci were detected on the direct gram-stained samples, and the culture showed a growth of *Staphylococcus lentus*. The drainage catheter was accordingly removed, and peritonitis was treated with intravenous teicoplanin at a dose of 400 mg daily for 7 days. The histopathologic assessment of the bone marrow biopsy specimen revealed no abnormalities.

Serum cytoplasmic antineutrophil cytoplasmic antibody (c-ANCA) and perinuclear ANCA (p-ANCA) were absent. The fresh stool samples taken for 3 consecutive days tested negative for parasites and helminth eggs. Results for the serum adhesin antigen for *Entamoeba histolytica*, indirect hemagglutination (IHA) test for *Fasciola hepatica*, and the IHA for hydatic cysts were also negative. The Mantoux tuberculin skin test (TST) revealed an induaration of 22 mm (range: 0–5 mm). The serum immunoglobulin G (IgG) levels for *Strongyloides sp.*, *Ascaris sp.*, and *Schistosoma mansoni* were slightly positive above the upper limit. However, the *T. canis* IgG was elevated (3.784; normal value < 0.706) (NovaLisa, NovaTEC Immundiagnostica GmbH, Germany). Treatment was initiated with oral albendazole at a dose of 400 mg twice a day for 5 days. The ascites and peripheral eosinophilia regressed completely within a week. Owing to the possibility of cross-reactions, the serological tests for the parasites were repeated at 15 days and again at the end of the second month. The results for the serum IgG for *Strongyloides sp.*, *Ascaris sp.*, and *Schistosoma* sp. at 2 months were all negative. *T. canis* IgG was positive in the repeated test.

The English language literature in the PubMed database was searched for a comprehensive review of previously reported cases of toxocara-related peritonitis. The search terms included: “gastrointestinal toxocariasis,” “*toxocara* and peritonitis,” “*toxocara* and ascites,” and “*toxocara* and eosinophilic gastroenteritis.” In order to identify additional cases, we also reviewed the reference sections of each case report of toxocara-related peritonitis that were found.

Only articles with the following criteria were included in this review: (1) *Toxocara* infection diagnosed by serological testing or biopsy, (2) ascites at initial presentation or during the clinical course of toxocariasis, (3) increased absolute eosinophil blood count, (d) clinical, laboratory, and treatment findings of individual cases were available and well-documented in the article.

A total of 7 cases of *Toxocara*-related peritonitis were included in our review, the mean age of these patients was 30 (range: 13–61) years.

To the best of our knowledge, this is the first review on non-disseminated toxocariasis that was restricted to the intestine and presented with eosinophilic ascites due to peritoneal inflammation. This discussion also reviews the clinical features of 7 additional previously published cases, the details of which are included in Table 1. The diagnosis of toxocara-related peritonitis is based on serological and histopathological findings, eosinophilic involvement of the gastrointestinal tract, ascites with clinical and/or radiological improvement after anthelmintic therapy, and the absence of any alternative diagnoses.

A definitive diagnosis of toxocariasis requires recognition of the larvae and eosinophilic granulomatous lesions in biopsy specimens [14]. In our review, endoscopic biopsies revealed eosinophilic infiltration in all patients except in one; this was suggestive of parasitic infection. The larvae were not detected in the gastric and intestinal biopsy specimens in any of the patients. However, the collection of suitable biopsy specimens is rarely justified in clinical practice. Actually, the likelihood of capture a larvae in one is extremely low. Therefore, in human toxocariasis, serology is an alternative means of diagnosis. The demonstration of *Toxocara*-specific IgG antibodies on enzyme-linked immunosorbent assay (ELISA) is useful in the diagnosis of toxocariasis [1]. However, the ELISA test is likely to cross-react with other parasites that may be confirmed by western blot tests [15]. In our case, a cross reaction to the IgG tests for *Strongyloides sp.*, *Ascaris sp.,* and *Schistosoma* sp. were initially observed.

A population based study in Brazil reported that *T. canis* infection is associated with increased levels of total IgE and mild eosinophilia [16]. The total serum IgE levels, which were available in 3 patients, were highly increased. However, in our case the serum IgE level was within normal limits. The discrepancy between eosinophilia and serum IgE levels in our case may have either reflected the sole intestinal involvement in our case or the other coincident endemic helminthiases.

It is noteworthy that none of the reported patients were in the early and late childhood age group and that their vital signs were within normal limits during the clinical course. Although, the majority of typical VLM patients are young, < 6 years of age, the rare and atypical presentation (eosinophilic peritonitis) that has developed in adult patients.

Eosinophilic ascites had been diagnosed in all the reported patients, except in our and one case. In one case, we could not understand the nature of the ascites cellularity from the English abstract” in the text. Cytopathology of the peritoneal fluid in our case revealed few macrophages and lymphocytes, compatible with chronic inflammation; this may have been either related to the late presentation or to the long-term indwelling catheter. However, since the patients in the late presented cases had eosinophilic ascites, the former possibility was unlikely. The presence of the indwelling catheter as foreign material and/or low virulence infection that developed in our patient after admission may hinder the eosinophilic inflammation.

Another unique finding in our patient was the presence of enlarged mesenteric and paraaortic lymph nodes that were never mentioned in the reported cases. However, lymphatic dissemination may occur in VLM leading to a mistaken diagnosis of lymphoma [17].

All the reported patients were treated with albendazole and the prognoses were good. Short term prednisolone treatment was instituted in 2 of the reported patients with symptomatic relief before treatment with albendazole. This observation indicates that the inflammation related to toxocariasis is related to the hypersensivity reaction to the larvae.

Toxocariasis may be restricted to the intestinal area raising the possibility of another clinical entity, namely, eosinophilic gastroenteritis (EG). Classical EG is defined by gastrointestinal symptoms with the evidence of eosinophilic infiltration in the biopsies taken from the mucosa of the gastrointestinal tract without an identifiable secondary cause [18]. In particular, parasitic infections should be excluded before the diagnosis of EGs. According to reports in medical literature, associated parasitic infections were found while investigating the etiology of EG; the causative parasites included *Strongyloides sp., Ascaris sp., Ancylostoma sp., Anisakis sp., Capillaria sp., Toxocara sp., Trichiura sp.,* and *Trichinella spp.*) [19]. Parasitic infections frequently present with self-limiting clinical progression that may be related to under-diagnosis. In conclusion, although toxocariasis may manifest with various clinical symptoms depending on the organ involved, isolated gastrointestinal tract involvement as found in our case is rare, and may present with enteritis and ascites due to eosinophilic inflammation.

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Declaration of Competing Interest

None.

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