CASE REPORT
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Delayed gastric emptying associated with *Strongyloides stercoralis* infection and pancreatic adenocarcinoma

Özgür Aktaş[1], Gizem Yasa[1], Oğuz Usta[2], Sidar Çöpür[3], Burcu Saka[4], Yeşim Beşli[5], Duygu Karahacıoğlu[6], Gürkan Tellioğlu[7], Önder Ergönül[2,8]

[1]Department of Medicine, Koç University Faculty of Medicine, İstanbul, Türkiye
[2]Department of Infectious Diseases and Clinical Microbiology, Koç University Faculty of Medicine, İstanbul, Türkiye
[3]Division of Internal Medicine, Department of Internal Medicine, Koç University Faculty of Medicine, İstanbul, Türkiye
[4]Department of Pathology, Koç University Faculty of Medicine, İstanbul, Türkiye
[5]Clinic of Clinical Laboratory, American Hospital, İstanbul, Türkiye
[6]Department of Radiology, Koç University Faculty of Medicine, İstanbul, Türkiye
[7]Department of General Surgery, Koç University Faculty of Medicine, İstanbul, Türkiye
[8]Koç University İşBank Center for Infectious Diseases (KUISCID), İstanbul, Türkiye

ABSTRACT

We present a rare case of co-occurrence of *Strongyloides stercoralis* (*S. stercoralis*) infection and newly diagnosed pancreatic adenocarcinoma in a 71-year-old female who presented with new-onset jaundice and right upper quadrant abdominal pain. The patient had eosinophilia, recurrent *Escherichia coli* cholangitis, and a strong family history of jaundice in an endemic region. *S. stercoralis* larvae were identified on histopathological examination following pancreaticoduodenectomy. Notably, ivermectin treatment attenuated the delayed postoperative gastric emptying that had not responded to conventional management, including nasogastric decompression or drainage of a perigastric collection. While *S. stercoralis* can cause obstructive jaundice and pancreatic masses, this case highlights the importance of considering parasitic infections in patients from endemic areas or with immunosuppressive conditions who present with abdominal symptoms, particularly to avoid unnecessary interventions and prevent clinical deterioration.

Keywords: Obstructive jaundice, *Strongyloides stercoralis* , parasite, pancreatic adenocarcinoma

INTRODUCTION

Strongyloides stercoralis is a parasitic nematode with the capacity for complex autoinfection, leading to dissemination of filariform larvae from the colon to the lungs, liver, central nervous system, or kidneys (1). Although globally prevalent, its incidence is likely underestimated due to limited data from endemic regions (2). Clinical manifestations vary widely and are typically classified as cutaneous, pulmonary, or intestinal. Cutaneous signs include larva currens and pruritus; pulmonary involvement may present as a Loeffler-like syndrome characterized by dyspnea, cough, and migratory pulmonary infiltrates; and gastrointestinal symptoms often include abdominal pain, diarrhea, and vomiting (3). Following the death of adult worms, a pronounced inflammatory response, termed the Mazzotti reaction, can occur and may require close patient monitoring (4,5). If untreated, the parasitic infection can progress to life-threatening hyperinfection syndrome, particularly in immunocompromised patients (6). This case demonstrates a rare scenario in which *S. stercoralis* was detected intraoperatively in a patient undergoing surgery for presumed pancreatic malignancy.

CASE REPORT

A seventy-one-year-old female patient with hypothyroidism, primary hypertension, type II diabetes mellitus, and new-onset atrial fibrillation presented with jaundice, right upper quadrant abdominal pain, and loss of appetite. The patient's past medical history was significant for two episodes of cholangiosepsis attributable to *Escherichia coli*, which required admission to the intensive care unit within the previous three months. The laboratory work-up at admission revealed neutrophilic leukocytosis (total white blood cell count: 16.2×10^9/L), eosinophilia (1.2×10^9/L),

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Corresponding Author
Önder Ergönül
E-mail: oergonul@ku.edu.tr
ORCID ID: orcid.org/0000-0003-1935-9235

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elevated acute-phase reactant (C-reactive protein: 115 mg/L), and direct hyperbilirubinemia (total bilirubin: 4.63 mg/dL). Abdominal computed tomography revealed a 32×25-mm hypodense lesion in the pancreatic head, invading the common bile duct and the main pancreatic duct, resulting in dilatation of the main pancreatic duct to 10 mm and of the intrahepatic bile ducts up to 9 mm. A retrospective review of preoperative imaging revealed no specific radiological signs suggestive of parasitic infection, such as bowel thickening or pneumatosis. The pancreatic head mass and biliary dilatation may have obscured subtle parasite-related changes (Figures 1 and 2). The patient underwent pancreaticoduodenectomy (Whipple procedure), which was extended to a total pancreatectomy and splenectomy due to positive surgical margins. Histopathological examination confirmed T2N2Mx pancreatic adenocarcinoma and revealed *S. stercoralis* in different forms, such as filariform larvae and adult worm from the gastric antrum to the distal duodenum (Figures 3 and 4). Detailed history of the patient revealed family members from the Black Sea region (7) with recurrent jaundice episodes, including a brother who died during jaundice workup without a cancer diagnosis. Postoperatively, the patient developed grade B delayed gastric emptying (DGE), unable to tolerate oral intake until postoperative day (POD) 19. Despite nasogastric decompression, symptoms of nausea and retching persisted. Diagnostic gastroscopy revealed an edematous narrowing of the efferent limb of gastrojejunostomy; however, the narrowing did not prevent advancing the scope distally, and a nasojejunal tube was inserted for enteral feeding. The resolution of the patient's complaints paralleled the completion of medical treatment for *S. stercoralis*, allowing oral feeding at POD 19. Ivermectin 15 mg orally for two days was initiated to eradicate *S. stercoralis*. Following treatment, clearance of *S. stercoralis* was confirmed by stool and respiratory samples collected on day 10, with no larvae detected. The absence of larvae in stool and respiratory samples collected during and after ivermectin treatment confirmed the efficacy of the therapy. The patient subsequently received adjuvant chemotherapy for locally advanced pancreatic adenocarcinoma, with a regimen that included gemcitabine and capecitabine. The patient's informed consent was obtained for publication.

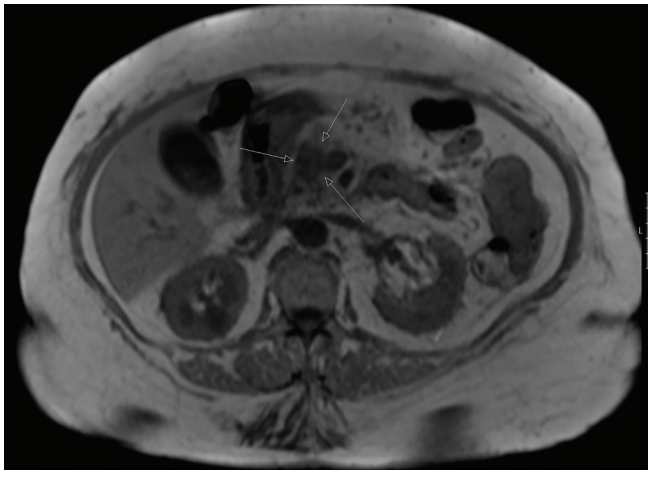

Figure 1. Coronal T1-weighted MRI: Hypointense pancreatic head mass (32×25 mm) with biliary and pancreatic duct dilatation.

MRI: Magnetic resonance imaging

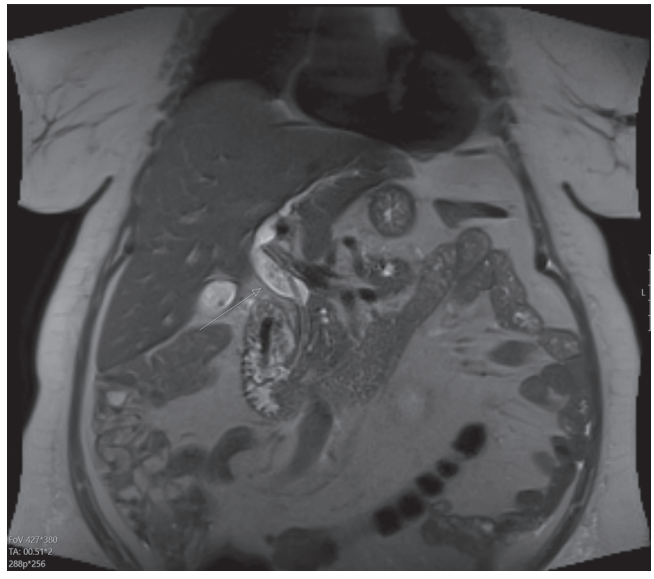

Figure 2. Axial T2-weighted MRI shows a pancreatic head mass with dilation of the main pancreatic duct (10 mm) and the intrahepatic duct (9 mm).

MRI: Magnetic resonance imaging

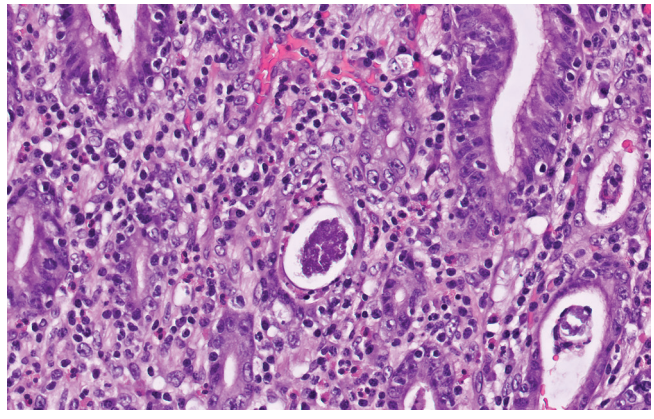

Figure 3. Numerous Strongyloides stercoralis organisms were detected in various forms within the intestinal lumen, from the proximal surgical margin (antrum) to the distal segment (jejunum). They were also detected in the distal segment of the choledochus. In this figure, the ova (A) are located centrally within the gastric pits, inducing lymphocytic gastritis characterized by marked lymphocytic infiltration of the epithelium (A: H&E x60, H&E x40).

H&E: Haematoxylin & eosin

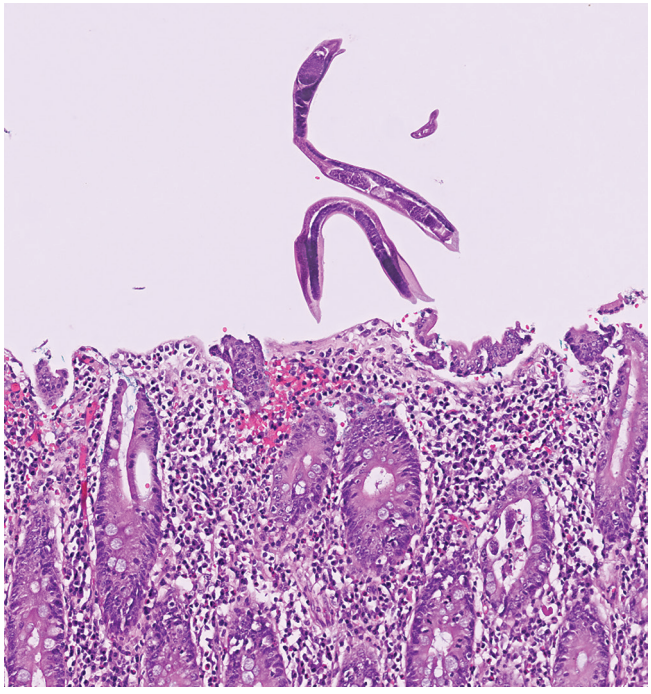

Figure 4. Typical worms were easily identified by their curved, sharply pointed tails. They were found in the duodenal lumen (B), within the crypts, and even deeper in the channels of the Brunner glands, where they created focal granulomatous inflammation (A: H&E x60, H&E x40).

H&E: Haematoxylin & eosin

DISCUSSION

This case presents an unusual coexistence of *S. stercoralis* infection and locally advanced pancreatic adenocarcinoma. While causality between these conditions cannot be established, the presence of parasitic forms throughout the gastrointestinal tract and improvement following ivermectin therapy suggest a significant parasitic contribution to postoperative complications.

Several clinical factors suggested parasitic infection rather than malignancy alone: A family history of jaundice in an endemic region, eosinophilia, acute onset of symptoms, and recurrent *E. coli* bacteremia. While *S. stercoralis* infection may cause malignancy-mimicking lesions in the pancreas (8), our patient had a histologically confirmed adenocarcinoma, indicating true coexistence of both conditions. The recurrent *E. coli* cholangiosepsis, which required hospitalization and intravenous antibiotic therapy, is particularly noteworthy as secondary bacterial superinfections may precede *S. stercoralis* infection. Hypothetical mechanisms include bacterial translocation through parasite-induced ulcers of the gastrointestinal mucosa, or bacteria carried on the larvae themselves (3). The absence of specific radiological features of strongyloidiasis highlights the challenge of preoperative diagnosis when malignancy coexists. The association between *S. stercoralis* infection and either obstructive jaundice or pancreatitis has been well established in multiple case series, particularly in patients with any degree of immunosuppression (9). Our patient's diabetes and potential cancer-related immunosuppression may have predisposed them to parasitic proliferation. The relationship between atrial fibrillation and *S. stercoralis* remains speculative, though such an association has been reported in an elderly male patient with disseminated infection and long-term corticosteroid therapy (10).

The most notable aspect of this case was the resolution of DGE following ivermectin treatment. DGE is a common morbidity, occurring in up to 80% of pancreatic surgeries, including total pancreatectomy (11). The International Study Group of Pancreatic Surgery defines DGE as the inability to tolerate oral feeding and the requirement for prolonged nasogastric intubation after surgery (12). Pancreatic anastomotic leakage or perigastric collections after surgery are the most commonly encountered causes of DGE. NG decompression and drainage of perigastric collections, as needed, are the mainstays of DGE treatment. However, there was no significant drainage from the NG tube, and no perigastric collection was identified in this patient.

The temporal relationship between ivermectin treatment and DGE resolution strongly suggests that *S. stercoralis* contributed to persistent gastric dysmotility. *S. stercoralis* infection has been associated with gastrointestinal motility disorders (13), and the parasite can cause severe inflammation and edema in affected areas, leading to intestinal narrowing and obstruction (14). The persistent edema observed in the efferent limb of gastrojejunostomy during endoscopy may have resulted from ongoing parasitic inflammation. While postoperative fever, eosinophilia, and abdominal pain have been attributed to *S. stercoralis* infection (15,16), DGE resolution following antiparasitic treatment has not been reported and represents a novel finding warranting further investigation.

The case underscores the diagnostic challenges of strongyloidiasis, which involves multiple testing modalities. Conventional stool analysis remains widely used but has notable disadvantages, being labor-intensive and requiring multiple stool samples to enhance parasitic yield (7) Advanced methods include the Baermann technique, which exploits larvae's ability to transition to the free-living stage, and Harada-Mori filter-paper method, which utilizes larvae's water tropism to concentrate them (17), though these remain time-consuming. Stool agar plates allow visualization of larval tracks on agar, but are costly, time-consuming, and pose potential safety risks to laboratory personnel (17). Serological testing has emerged as a promising non-invasive alternative; indirect immunofluorescence demonstrates a sensitivity of 97% and a specificity of 98% (18). However, the meta-analysis by Kalantari et al. (19) showed that the pooled sensitivity and specificity of serological assays were

71.7% [95% confidence interval (CI): 56.07% to 83.4%] and 89.9% (95% CI: 80.8% to 94.9%), respectively. A clear limitation of serology is its inability to differentiate past from active infections due to antibody persistence and cross-reactivity with other helminthic diseases (17). Additionally, molecular testing using polymerase chain reaction targeting 18S ribosomal DNA is another diagnostic modality with a specificity of 99-100%; however, sensitivity varies markedly with parasitic burden, decreasing to 15% in low-burden infections (20). A recently developed loop-mediated isothermal amplification assay with real-time polymerase chain reaction shows promising results but requires further validation (21,22). Invasive diagnostic methods for *S. stercoralis* involve endoscopy with duodenal aspirate or biopsy, which can reveal eosinophilic infiltration, mucosal erosions, ulcerations, and granulomatous inflammation within the crypts, as observed in our case (17,23). In cases of strong clinical suspicion, particularly in immunocompromised patients from endemic regions, empirical ivermectin treatment (one or more doses) may be warranted before confirmatory testing, given the high morbidity and mortality associated with untreated infection.

Ivermectin remains the drug of choice for *S. stercoralis* infection, with albendazole as an alternative therapy. A randomized trial involving 309 patients with non-disseminated Strongyloides infection showed equivalent efficacy of single- and multiple-dose regimens (85% vs. 86%; p=0.75), and single-dose therapy was better tolerated, although most adverse events were mild (24). We utilized a multiple-dose regimen with no adverse events and achieved successful parasite clearance.

S. stercoralis is an uncommon cause of gastrointestinal or hepatobiliary disease worldwide (25). A focused history, including travel to endemic regions, remains the most useful diagnostic tool (7). In patients from endemic areas presenting with obstructive jaundice, recurrent *E. coli* sepsis, and eosinophilia, the next step should be to order three consecutive stool samples (7). Performing seven consecutive stool examinations further increases the detection rate of rhabditiform larvae. When the burden of rhabditiform larvae is high, direct microscopic examination of the stool specimen reveals clear motility (6,7). This case emphasizes the critical importance of considering parasitic infections in the differential diagnosis of obstructive jaundice, particularly in patients from endemic areas. However, the inability to definitively establish the causal relationship between *S. stercoralis* and DGE represents a significant limitation. Large-scale clinical studies are needed to investigate this potential association and establish evidence-based management protocols for patients with concurrent parasitic infections undergoing major abdominal surgery.

Ethics

Informed Consent: The patient provided informed consent prior to enrollment in the case study.

Footnotes

Author Contributions

Surgical and Medical Practices - G.Y., G.T.; Concept - Ö.A., Ö.E., O.U., Y.B., B.S., S.Ç.; Design - Ö.A., Ö.E., O.U., B.S., D.K.; Data Collection or Processing - Y.B., B.S., D.K.; Literature Search - Ö.A., Ö.E., O.U., Y.B., S.Ç.; Writing - Ö.E., O.U., Y.B., S.Ç., B.S.

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REFERENCES

1. *Choksi TT, Madison G, Dar T, Asif M, Fleming K, Clarke L, et al. Multiorgan dysfunction syndrome from Strongyloides stercoralis hyperinfection in a patient with human T-cell lymphotropic virus-1 coinfection after initiation of ivermectin treatment. Am J Trop Med Hyg. 2016;95:864-867.*
2. *Schär F, Trostdorf U, Giardina F, Khieu V, Muth S, Marti H, et al. Strongyloides stercoralis: global distribution and risk factors. PLoS Negl Trop Dis. 2013;7:e2288.*
3. *Nutman TB. Human infection with Strongyloides stercoralis and other related Strongyloides species. Parasitology. 2017;144:263-273.*
4. *Olson BG, Domachowske JB. Mazzotti reaction after presumptive treatment for schistosomiasis and strongyloidiasis in a Liberian refugee. Pediatr Infect Dis J. 2006;25:466-468.*
5. *Twum-Danso NA. Serious adverse events following treatment with ivermectin for onchocerciasis control: a review of reported cases. Filaria J. 2003;2(Suppl 1):S3.*
6. *Krolewiecki A, Nutman TB. Strongyloidiasis: a neglected tropical disease. Infect Dis Clin North Am. 2019;33:135-151.*
7. *Ardiç N. [An overview of Strongyloides stercoralis and its infections]. Mikrobiyol Bul. 2009;43:169-77.*
8. *Pijls NH, Yap SH, Rosenbusch G, Prenen H. Pancreatic mass due to Strongyloides stercoralis infection: an unusual manifestation. Pancreas. 1986;1:90-93.*
9. *Ikeuchi N, Itoi T, Tonozuka R, Mukai S, Koyama Y, Tsuchiya T, et al. Strongyloides stercoralis infection causing obstructive jaundice and refractory pancreatitis: a lesson learned from a case study. Intern Med. 2016;55:2081-2086.*
10. *Gordon SM, Gal AA, Solomon AR, Bryan JA. Disseminated strongyloidiasis with cutaneous manifestations in an immunocompromised host. J Am Acad Dermatol. 1994;31:255-259.*
11. *Noorani A, Rangelova E, Del Chiaro M, Lundell LR, Ansorge C. Delayed gastric emptying after pancreatic surgery: analysis of factors determinant for the short-term outcome. Front Surg. 2016;3:25.*
12. *Wente MN, Bassi C, Dervenis C, Fingerhut A, Gouma DJ, Izbicki JR, et al. Delayed gastric emptying (DGE) after pancreatic surgery: a suggested definition by the International Study Group of Pancreatic Surgery (ISGPS). Surgery. 2007;142:761-768.*
13. *Ghoshal UC, Bhut B, Misra A. Patients with specific gastrointestinal motility disorders are commonly diagnosed as functional GI disorders in the early stage by community physicians due to lack of awareness. Turk J Gastroenterol. 2021;32:336-348.*
14. *Aslam A, Barlas U, Yassan LJ, Lodhi M. An unusual case of gastric outlet obstruction and melena. Clin J Gastroenterol. 2022;15:374-380.*
15. *Won EJ, Jeon J, Koh YI, Ryang DW. Strongyloidiasis in a diabetic patient accompanied by gastrointestinal stromal tumor: cause of eosinophilia unresponsive to steroid therapy. Korean J Parasitol. 2015;53:223-226.*

16. *Seo AN, Goo YK, Chung DI, Hong Y, Kwon O, Bae HI. Comorbid gastric adenocarcinoma and gastric and duodenal Strongyloides stercoralis infection: a case report. Korean J Parasitol. 2015;53:95-99.*
17. *Requena-Mendez A, Chiodini P, Bisoffi Z, Buonfrate D, Gotuzzo E, Munoz J. The laboratory diagnosis and follow up of strongyloidiasis: a systematic review. PLoS Negl Trop Dis. 2013;7:e2002.*
18. *Boscolo M, Gobbo M, Mantovani W, Degani M, Anselmi M, Monteiro GB, et al. Evaluation of an indirect immunofluorescence assay for strongyloidiasis as a tool for diagnosis and follow-up. Clin Vaccine Immunol. 2007;14:129-133.*
19. *Kalantari N, Chehrazi M, Ghaffari S, Gorgani-Firouzjaee T. Serological assays for the diagnosis of Strongyloides stercoralis infection: a systematic review and meta-analysis of diagnostic test accuracy. Trans R Soc Trop Med Hyg. 2020;114:459-469.*
20. *Sultana Y, Jeoffreys N, Watts MR, Gilbert GL, Lee R. Real-time polymerase chain reaction for detection of Strongyloides stercoralis in stool. Am J Trop Med Hyg. 2013;88:1048-1051.*
21. *Watts MR, James G, Sultana Y, Ginn AN, Outhred AC, Kong F, et al. A loop-mediated isothermal amplification (LAMP) assay for Strongyloides stercoralis in stool that uses a visual detection method with SYTO-82 fluorescent dye. Am J Trop Med Hyg. 2014;90:306-311.*
22. *Watts MR, Kim R, Ahuja V, Robertson GJ, Sultana Y, Wehrhahn MC, et al. Comparison of loop-mediated isothermal amplification and real-time PCR assays for detection of strongyloides larvae in different specimen matrices. J Clin Microbiol. 2019;57:e01174-18.*
23. *Kakati B, Dang S, Heif M, Caradine K, McKnight W, Aduli F. Strongyloides duodenitis: case report and review of literature. J Natl Med Assoc. 2011;103:60-63.*
24. *Buonfrate D, Salas-Coronas J, Munoz J, Maruri BT, Rodari P, Castelli F, et al. Multiple-dose versus single-dose ivermectin for Strongyloides stercoralis infection (Strong treat 1 to 4): a multicentre, open-label, phase 3, randomised controlled superiority trial. Lancet Infect Dis. 2019;19:1181-1190.*
25. *Piranavan P, Kalantri P, Pandey D, Bharadwaj HS, Verma A. Strongyloides stercoralis hyperinfection syndrome: a neglected cause of abdominal pain. Cureus. 2020;12:e10671.*