International Journal of Surgery Open 57 (2023) 100651

Contents lists available at ScienceDirect

International Journal of Surgery Open

journal homepage: www.elsevier.com/locate/ijso

Case Report

Duodenal *Strongyloides stercoralis* infection in a 56-year old male: A case report

James J. Yahaya *, Emmanuel D. Morgan, Emmanuel Othieno

Department of Pathology, School of Health Sciences, Soroti University, Soroti, Uganda

ARTICLE INFO

Keywords:
Strongyloides stercoralis
Duodenum
Chronic diarrhea
Hyperinfection
Case report

ABSTRACT

Introduction and importance: The infection caused by *Strongyloides stercoralis (S stercoralis)* is usually an asymptomatic condition particularly in immunocompetent individuals and the condition may remain unnoticed even for decades, however, strongyloidiasis is more severe in patients who are immunocompromised.

Case presentation: The patient is a 56-year old male who presented with nine months history of episodes of abdominal pain, nausea loss of appetite, and chronic diarrhea. His diarrhea had mucus and trace blood. His oesophagogastroduodenoscopy (OGD) revealed erythematous, hypertrophied, and ulcerating lining mucosa of the duodenum. The specimen sampled showed sections of the duodenum with numerous *Strongyloides stercoralis* larvae, some inside the crypts with associated active duodenitis.

Clinical discussion: Despite the asymptomatic nature of *Strongyloides stercoralis* infectious condition especially for immunocompetent patients, the infection may sometimes result into serious complications including exudative enteropathy and paralytic ileus. The clinical outcome of patients with strongyloidiasis is usually better despite severe infection may develop and it is associated with slightly increased morbidity and even mortality.

Conclusion: Diagnosis of *Strongyloides stercoralis* infection in individuals residing in tropical or subtropical countries who present with chronic diarrhea, abdominal pain should always be considered so as to avoid delay of diagnosis. This may help in preventing unnecessary complication such as severe anaemia, intestinal perforation or even death.

1. Introduction

Strongyloides stercoralis (*S. stercoralis*) is an intestinal nematode parasitic infection which frequently occurs in tropical and subtropical countries and also in countries with temperate climates [1]. In a study done by Buonfrate et al. the global prevalence of strongyloidiasis in 2017 was estimated to be 8.1% (95% CI: 4.2–12.4%), corresponding to 613.9 (95% CI: 313.1–910.1) million people that were infected, and the South-East Asia, African, and Western Pacific Regions accounted for 76.1% of the global infections [2]. Strongyloidiasis is rare in travelers, except those visiting friends and relatives and cooperants, and it is mainly diagnosed in migrants from endemic regions [3]. Strongyloidiasis has a higher prevalence in the immigrants who are asymptomatic and therefore, it has been recommended that immigrants from endemic areas should be routinely screened for *S. stercoralis* infection by using for example stool test or serology test [4,5]. *S. stercoralis* usually causes asymptomatic condition particularly in immunocompetent individuals and the infection may remain unnoticed even for decades, however, strongyloidiasis has been found more severe in patients who are immunocompromised particularly those on corticosteroids use and the condition may be associated with high morbidity and mortality [1,3,6].

There are two forms of complicated strongyloides infections including hyperinfection syndrome and disseminated strongyloidiasis. Hyperinfection syndrome is defined as an amplification of the normal life cycle of *S. stercoralis* without the spread of larvae outside of the usual migration pattern for instance gastrointestinal tract and lungs [7]. Disseminated disease is defined by the presence of parasites out-side of the traditional life cycle (i. e, in organs other than the skin, GI tract, or lungs) [7] and this form of strongyloidiasis carries a mortality rate of approximately 90% [3]. Several risk factors are associated with the development of disseminated strongyloidiasis, including (1) immune deficiency, (2) hematologic malignancy, (3) steroids administration, (4) HTLV-1 infection, (5) chronic alcoholism, (6) renal failure, (7) transplantation, among others [8]. In disseminated disease, translocation of enteric bacteria may occur, leading to Gram-negative sepsis and/or meningitis. The enteric microorganism can either enter the circulation

* Corresponding author. Department of Pathology, School of Health sciences, Soroti University, P. O. Box 211, Soroti, Uganda.
E-mail address: jayame76@gmail.com (J.J. Yahaya).

https://doi.org/10.1016/j.ijso.2023.100651
Received 30 December 2022; Received in revised form 7 July 2023; Accepted 10 July 2023
Available online 12 July 2023
2405-8572/© 2023 The Authors. Published by Elsevier Ltd on behalf of Surgical Associates Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

through intestinal ulcers or be carried by the infective filariform larvae.

Diagnosis of *S. stercoralis* infection mainly depends on serology and rarely tissue samples are taken for histological evaluation. Studies have shown that 50%-70% of stool examinations turn to be negative [9]. This is because it is difficulty for the female *S. stercoralis* to shed their eggs into the intestine. The problem for diagnostics is that. different from for example hook worms, the young larvae hatch while still within the intestine of the patient. Therefore, in the stool of infected patients there are *S. stercoralis* larvae, not eggs and they are not detected with diagnostic methods designed to detect nematode eggs. However, diagnosis of disseminated *S. stercoralis* infection is usually easy due to obvious clinical manifestations and large number of larvae that are frequently seen in cerebrospinal fluid (CSF) and bronchoalveolar lavage fluid or other bodily fluids unlike hyperinfection syndrome in which the larvae are limited to the gastrointestinal tract and lungs [9]. Treatment for patients infected with *S. stercoralis* usually is intended to clear both symptoms and infection in symptomatic individuals and cure in asymptomatic individuals to prevent possible serious complications in individuals harboring infections chronically [10]. The treatment choices are based on type of infection; whether uncomplicated or hyperinfection syndrome which is usually chronic and fatal complication.

In this work, the case of a 56-year old male indigenous Ugandan with a histologically confirmed diagnosis of duodenal *S. stercoralis* is being reported.

2. Case presentation

The patient is a 56-year old male who presented at the gastroenterology unit with a nine months history of episodes of fever, abdominal pain, nausea, loss of appetite, and chronic diarrhea which was associated with mucus and traces of blood. The nature of abdominal pain was described as epigastric, sharp and non-radiating, which would worsen after eating, and not relieved by defecation. The patient had uneventful past medical and family history. Either he had no known history of drug reaction and any relevant genetic information or smoking. On physical examination, he was slightly wasted (body weight 51 kg) and pale with normal vital signs. His abdomen was soft but markedly tender on percussion around the epigastrium region. Neither free fluid nor organomegaly was found. No peritoneal signs could be elicited. His digital rectal examination was unremarkable, and all other systems were unremarkable.

Complete blood count (CBC) showed anaemia with haemoglobin level of 10 g/dl and normal white blood cell count (WBC) with almost all normal differentials except eosinophil count which revealed severe eosinophilia (5600×10^3/mm). Urinalysis did not show any evidence of urinary tract infection. Acute abdominal series was obtained and showed no evidence of obstruction or perforation. History of using steroids, HIV status, and HTLV-1 tests also were negative. The patient later underwent oesophagogastroduodenoscopy (OGD) which revealed erythematous, hypertrophied, and ulcerating lining mucosa of the duodenum (image not shown) from which endoscopic tissue biopsies were taken for histological analysis. The specimen sampled showed sections of the duodenum with numerous *S stercoralis* larvae, some inside the crypts with associated active duodenitis (Fig. 1A–D).

As the patient weighed 51 kg, he was started on an oral course of ivermectin 9 mg daily until his symptoms of fever, abdominal pain, nausea, vomiting and diarrhea resolved. The patient received ivermectin for a total of 14 days. Two months later, he was evaluated for possible reoccurrence of the symptoms, however, he was found to have none. Furthermore, microscopic examination of stool and detection of strongyloides IgG antibodies were performed during follow-up of the patient which were both negative for larvae and larval antigen, respectively. This work has been reported in line with the SCARE 2020 criteria [11].

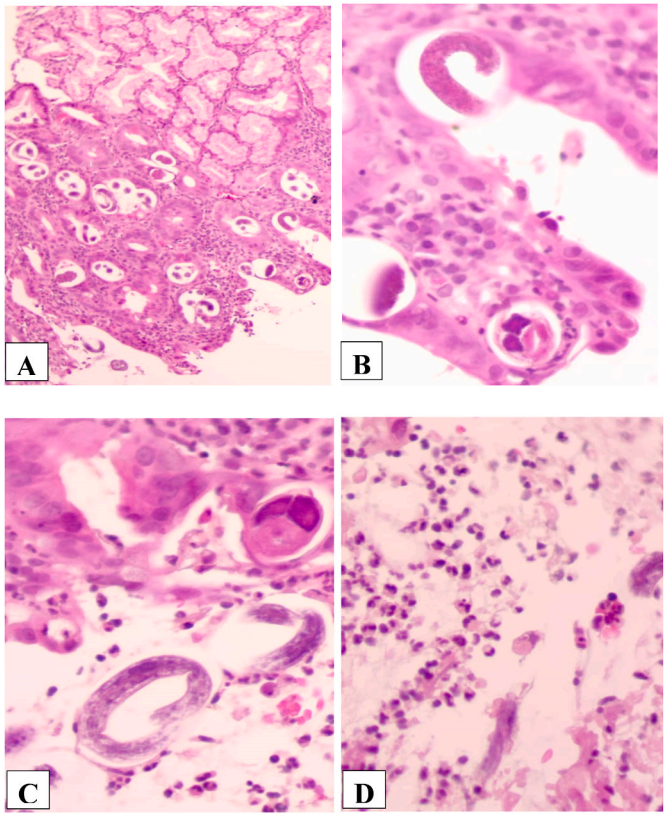


Fig. 1. (A) Photomicrography showing normal duodenal mucosal glands beneath there are numerous *S stercoralis* larvae and adult female parasites causing mounting of chronic inflammatory cells (haematoxylin and eosin stain, x100), (B) and (C) Photomicrographs showing numerous *S stercoralis* large larvae inside the crypts (haematoxylin and eosin, x400), and (D) photomicrography showing intense infiltration of eosinophilis in vicinity of the larvae (haematoxylin and eosin, x400).

3. Discussion

The life cycle of *S. stercoralis* is complex and human beings become infected after filariform larvae dwelling in fecally contaminated soil penetrate the skin or mucous membranes of susceptible hosts [3]. After the skin of the person gets in contact with soil contaminated with larvae, the larvae penetrate the skin of the host and then are carried to the lungs through the blood circulation and later on the larvae perforate the alveoli and gain access to the pharynx and finally become ingested and land to the small intestine where they become residents [12]. The larvae molt twice to become adult female worms that produce eggs in the lining intestinal mucosa of the host. Once they hatch, the new rhabditiform larvae travel to the lumen. From there, they reach the stool or cause autoinfection (re-infection). When the parasite lands in the intestines, patients present with abdominal pain, nausea, and vomiting and sometimes they may present with paralytic ileus and exudative enteropathy. Similarly, the patient described in this report was also presenting with abdominal pain, nausea and vomiting but without paralytic ileus or exudative enteropathy [9]. In uncomplicated form of strongyloidiasis, the disease is normally asymptomatic or it is responsible for minor and non-specific symptoms that may last even for decades without the patients noticing them [9].

Although classic parasitologic methods for identification of larvae through either culture or direct methods such as Kato-Katz, McMaster technique, and flotation technique (FLOTAC) are still used in many laboratories. However, their challenges for labour and relatively low sensitivity have paved a way towards involving new immunological and nucleic acid amplification (NAAT)-based methods for diagnosis of

strongyloidiasis for clinical and public health perspectives [13]. Since the larval output is intermittent, stool examination might be insufficiently sensitive to evaluate the efficacy of a given treatment [14]. Moreover, positive stool examinations have been described even one or two years after initially negative post treatment results [15,16]. Accordingly, a negative result should not be interpreted as unequivocal evidence of the absence of infection [17]. Strongyloidiasis is frequently under diagnosed since many cases remain asymptomatic and routine diagnostic tests based on parasitological examination have low sensitivity.

Serological diagnostic tests for diagnosis and follow-up after treatment of strongyloidiasis may sometimes have decreased specificity as a result of cross-reactivity, especially in areas with other endemic parasitic infections [18]. Most serological tests suffer significant cross-reactivity with other nematode species, particularly with filarial infections, which is one of the major disadvantage of these tests [19]. Therefore, serology usually overestimates the burden of this disease whereas parasitological techniques underestimate it [19]. Another diagnostic challenge associated with serological tests for example ELISAs for the diagnosis of strongyloidiasis is that, the antigens are mostly poorly defined and the laboratory protocols vary substantially [20]. Another clinical utility of serological tests is in evaluating the results of treatment of strongyloidiasis which is mandatory to confirm the eradication of *S. stercoralis*, particularly migrating larvae, because of the risk of autoinfection [21].

Treatment of strongyloidiasis depends on form of infection and severity of the infection. Asymptomatic, acute and chronic uncomplicated *S. stercoralis* infection is managed using 200 μg/kg for 2 days with alternative to either albendazole 400 mg orally twice daily between 3 and 7 days or thiabendazole 25 mg/kg orally twice daily for 3 days [9]. On the other hand, hyperinfection syndrome is treated using oral dose of ivermectin 200 mg/kg/day for at least 2 weeks after observing negative stools results for larvae. Alternatively, either subcutaneous ivermectin 200 mg/kg, daily, divided doses, each arm, until negative stool examination persists for 2 weeks or until the patient can tolerate dosing by mouth or using rectal ivermectin, 200 mg/kg daily, until negative stool examination persists for 2 weeks or albendazole 400 mg orally twice a day in addition to ivermectin [9,22]. Rectal ivermectin dose is given particularly in patients with paralytic ileus [23]. In a study by Buonfrate et al. which involved a clinical trial (STRONG-TREAT) it was recommended that a single dose of ivermectin would be satisfactory for the treatment of non-disseminated strongyloidiasis due to the fact that it was observed that multiple doses of ivermectin did not show higher efficacy and was tolerated less than a single dose [24]. Surgical interventions may be required in rare instances of acute abdominal symptoms (peritonitis) due to bowel obstruction or infarction in severe strongyloidiasis such as hyperinfection syndrome and disseminated strongyloidiasis often have complications including sepsis, shock, and acute respiratory distress syndrome (ARDS), therefore these patients require optimal surgical management with properly equipped intensive of care [19,25].

4. Conclusion

There is a need of increasing the index of clinical suspicion for possibility of *S. stercoralis* infection among health care workers especially in endemic areas. Screening of asymptomatic migrants and travelers returning to their home countries from endemic areas with *S. stercoralis* should always screened for possible infection using serological tests. Early diagnosis of such parasitic infection in immunocompromised patients is life saving and avoids fatality caused by hyperinfection or systemic dissemination.

International journal of surgery open

The following information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned. If you have nothing to declare in any of these categories then this should be stated.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

Not applicable. Ethics approval is not required for case reports. The exemption was done by the St. Francis Hospital Research Ethical Committee.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Authors' contribution

JJY and EDM: acquisition, organizing, and writing the first draft of the manuscript and EO: preparation of the images. All authors reviewed the manuscript critically.

Research registration

Not applicable.

Registration of research studies

Not applicable because the case reported is not the first and it does not include use of new drug.

Guarantor

James J Yahaya agreed to be the guarantor and accepted to have full responsibility for the work.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijso.2023.100651.

References

[1] Yerra S, Yarra P. Case report of a computerized tomography sign in Strongyloides stercoralis infection. Int Med Case Rep J 2017;10:219–22.
[2] Buonfrate D, Bisanzio D, Giorli G, Odermatt P, Fürst T, Greenaway C, et al. The global prevalence of strongyloides stercoralis infection. Pathogens 2020;9(6):1–9.
[3] Bdioui A, Bchir A, Missaoui N, Hmissa S, Mokni M. Histopathological diagnosis of strongyloidiasis hyperinfection in Tunisian patient with hodgkin lymphoma: case report. Ann Med Surg 2021;66(April):102367. https://doi.org/10.1016/j.amsu.2021.102367 [Internet].

[4] Ramos-Sesma V, Navarro M, Llenas-García J, Gil-Anguita C, Torrús-Tendero D, Wikman-Jorgensen P, et al. Asymptomatic strongyloidiasis among Latin american migrants in Spain: a community-based approach. Pathogens 2020;9(6):1–14.
[5] Casado L, Rodriguez-Guardado A, Boga JA, Fernández-Suarez J, Martínez-Camblor P, Rodríguez-Perez M, et al. Use of serology in a systematic screening programme for strongyloidiasis in an immigrant population. Int J Infect Dis 2019; 88:60–4.
[6] Kakati B, Dang S, Heif M, Caradine K, McKnight W, Aduli F. Strongyloides duodenitis: case report and review of literature. J Natl Med Assoc [Internet] 2011; 103(1):60–3. https://doi.org/10.1016/S0027-9684(15)30246-7.
[7] Ganesh S, Cruz RJ. Review - strongyloidiasis: A multifaceted disease. Gastroenterol Hepatol 2011;7(3):194–6.
[8] Yoshida H, Endo H, Tanaka S, Ishikawa A, Kondo H, Nakamura T. Recurrent paralytic ileus associated with strongyloidiasis in a patient with systemic lupus erythematosus. Mod Rheumatol 2006;16(1):44–7.
[9] Krolewiecki A, Nutman TB. Strongyloidiasis: a neglected tropical disease. Infect Dis Clin 2019;33(1):135–51.
[10] Khieu V, Schär F, Marti H, Sayasone S, Duong S, Muth S, et al. Diagnosis, treatment and risk factors of strongyloides stercoralis in schoolchildren in Cambodia. PLoS Neglected Trop Dis 2013;7(2).
[11] Agha RA, Franchi T, Sohrabi C, Mathew G, Kerwan A, Thoma A, et al. The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines. Int J Surg 2020;84(October):226–30.
[12] Lervolino LG, Baldin PEA, Picado SM, Calil KB, Viel AA, Campos LAF. Prevalence of sickle cell disease and sickle cell trait in national neonatal screening studies. Rev Bras Hematol Hemoter 2011;33(1):49–54.
[13] Buonfrate D, Formenti F, Perandin F, Bisoffi Z. Novel approaches to the diagnosis of Strongyloides stercoralis infection. Clin Microbiol Infect 2015;21(6):543–52.
[14] Hailu T, Amor A, Nibret E, Munshea A, Anegagrie M, Flores-Chavez MD, et al. Evaluation of five diagnostic methods for Strongyloides stercoralis infection in Amhara National Regional State, northwest Ethiopia. BMC Infect Dis 2022;22(1): 1–9. https://doi.org/10.1186/s12879-022-07299-1 [Internet].
[15] Luvira V, Siripoon T, Phiboonbanakit D, Somsri K, Watthanakulpanich D, Dekumyoy P. Strongyloides stercoralis: a neglected but fatal parasite. Trav Med Infect Dis 2022;7(10).
[16] Greaves D, Coggle S, Pollard C, Aliyu SH, Moore EM. Strongyloides stercoralis infection. BMJ 2013;347(7919):1–6.
[17] Tamarozzi F, Longoni SS, Mazzi C, Rizzi E, Noordin R, Buonfrate D. The accuracy of a recombinant antigen immunochromatographic test for the detection of Strongyloides stercoralis infection in migrants from sub-Saharan Africa. Parasites Vectors 2022;15(1):1–7. https://doi.org/10.1186/s13071-022-05249-z [Internet].
[18] Salvador F, Sulleiro E, Sánchez-Montalvá A, Saugar JM, Rodríguez E, Pahissa A, et al. Usefulness of strongyloides stercoralis serology in the management of patients with eosinophilia. Am J Trop Med Hyg 2014;90(5):830–4.
[19] Requena-Méndez A, Chiodini P, Bisoffi Z, Buonfrate D, Gotuzzo E, Muñoz J. The laboratory diagnosis and follow up of strongyloidiasis: a systematic review. PLoS Neglected Trop Dis 2013;7(1).
[20] Johnston FH, Morris PS, Speare R, McCarthy J, Currie B, Ewald D, et al. Strongyloidiasis: a review of the evidence for Australian practitioners. Aust J Rural Health 2005;13(4):247–54.
[21] Satoh M, Kokaze A. Treatment strategies in controlling strongyloidiasis. Expet Opin Pharmacother 2004;5(11):2293–301.
[22] Pedersen AA, Hartmeyer GN, Stensvold CR, Martin-Iguacel R. Strongyloides stercoralis hyperinfection syndrome with cerebral involvement. BMJ Case Rep 2022;15(9):1–5.
[23] Rodriguez-Perez EG, Arce-Mendoza AY, Saldivar-Palacios R, Escandon-Vargas K. Fatal strongyloides stercoralis hyperinfection syndrome in an alcoholic diabetic patient from Mexico. Biomedica 2020;40:32–6.
[24] Buonfrate D, Salas-Coronas J, Muñoz 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(11):1181–90.
[25] Puthiyakunnon S, Boddu S, Li Y, Zhou X, Wang C, Li J, et al. Strongyloidiasis—an insight into its global prevalence and management. PLoS Neglected Trop Dis 2014; 8(8).