


CASE REPORT

Open Access



Enterobius vermicularis (pinworm) infestation mimicking acute appendicitis in two children from Palestine: a case report

Issam Jawabreh¹, Ahmad Amro², Kifaya Azmi^{1,4}, Hamza Batran³, Ziad Abdeen⁴ and Omar Hamarsheh^{5*} 

Abstract

Background Pinworm, *Enterobius vermicularis*, is a common parasitic illness, particularly among children in Palestine. On rare occasions, it can cause serious consequences such as acute appendicitis, which can still present a challenging diagnosis especially in children.

Case presentation This report describes two cases (a 9 year old male and a 11 year old female, both Palestinian children from Hebron district) of acute appendicitis referred to Queen Alia Hebron Governmental Hospital in Palestine. The clinical examination revealed a lower abdominal pain, and they were diagnosed with appendicitis. The pathological examination after appendectomy showed the presence of eggs and pinworms. Anthelmintic medication was provided, and they were followed up for 6 weeks after the operation without any incidents.

Conclusion These cases highlight the importance of considering *Enterobius vermicularis* infestation in children with abdominal pain, as the parasites can mimic appendicitis. Prompt recognition and cautious laparoscopic appendectomy are crucial to prevent unnecessary surgery and peritoneal contamination, with the infestation being easily treatable with anthelmintic medication.

Keywords *Enterobius vermicularis*, Appendicitis, Pinworm, Palestine

Introduction

Across the world, suspected acute appendicitis is one of the most common emergency abdominal procedures. This condition, often presents as abdominal pain, results from an infection and obstruction of the appendix. Abdominal imaging, laboratory testing, physical examination, and medical history of the patient are all

important for diagnosis. A low-grade temperature, nausea, sporadic vomiting, loss of appetite, migrating discomfort to the right lower abdomen, and nonspecific periumbilical pain are examples of classic symptoms. In almost 90% of instances, these symptoms result in the diagnosis of acute appendicitis [1]. A laparoscopic appendectomy is the most typical course of therapy. Appendicitis can be caused by many different factors; in rare instances, it can be brought on by intestinal parasites, low-grade appendicular mucinous neoplasms, neuroendocrine tumors, and serrated adenomas.

Pinworms, *Enterobius vermicularis*, are the most common human parasite, accounting for 40% of all helminth infections reported in the USA. From 2008 to 2018, the Palestinian Ministry of Health recorded 29,390 cases of *E. vermicularis* infection, with 1.1% (329 cases) in the Gaza Strip and 98.9% (29,061 cases) in the West Bank.

*Correspondence:

Omar Hamarsheh
ohamarsheh@staff.alquds.edu

¹ Faculty of Medicine, Al-Quds University, Jerusalem, Palestine

² Faculty of Pharmacy, Al-Quds University, Jerusalem, Palestine

³ Department of Hematology, Queen Alia Hebron Governmental Hospital, Hebron, Palestine

⁴ Al-Quds Public Health Society, Jerusalem, Palestine

⁵ Department of Biology, Al-Quds University, P.O. Box 51000, Jerusalem, Palestine



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Recent studies demonstrate that the West Bank and, to a lesser extent, the Gaza Strip have high rates of *E. vermicularis* infection [2, 3]. Pinworm infection is a self-limiting disease, because adult worms have a very short life expectancy unless they autoinfect the patient, and the most common symptom of this infection is pruritus, which usually rises at night while the infected person is asleep [4].

Pinworms can migrate to the vaginal region and cause discomfort or inflammation, a condition known as vulvovaginitis, which is a rare scenario. *Escherichia coli* and other bacteria may stick to this inflamed region and cause an infection of the urinary system [5]. Additionally, pinworm infestation has been connected to acute appendicitis, and it is the most common helminthic infection in the appendiceal lumen.

Pinworms were initially found in the appendix by Fabricius in 1634, but a clear causal connection has not yet been shown. For many years, there has been discussion on *E. vermicularis* potential role in the development of acute appendicitis [6].

Case presentation

Case-1

A 9-year-old Palestinian Arab boy, accompanied by his parents, was referred by his general practitioner to the emergency department of Hebron Governmental Hospital (Queen Alia Hospital, Hebron, Palestine). He presented with 10 hour history of predominant abdominal pain radiating from his umbilicus to the right iliac fossa (RIF). The medical history of the patient obtained from the family. The patient had no history of hospital admission and no previous medical surgery or known drug allergies. On arrival at the hospital, the patient

presented with no vomiting, fever, diarrhea, or seizures. Upon examination, the patient's vital signs were within normal limits, alert conscious, mildly dehydrated, with no cyanosis or jaundice.

The radiating pain in the lower abdomen mainly in the RIF area was progressive. These manifestations raises suspicions of acute appendicitis. Biochemical laboratory analysis showed an increased C-reactive protein (23 mg/L, $N=0-6$ mg/L) and a normal liver function test. Hematological investigations revealed a normal eosinophil ($0.09 \times 10^9/L$, $N=0.02-0.62 \times 10^9/L$), mild leukocytosis ($15.7 \times 10^9/L$, $N=4.5-10.6 \times 10^9/L$) and neutrophils (89%, $N=50-70\%$). Microscopic examination of urine was normal.

Ultrasonography showed an enlarged appendix, 6–7 mm in diameter, without echogenic fat plans and no free fluids. After diagnosis confirmation of appendicitis, the patient was kept nothing by mouth (NPO) for laparoscopic appendectomy operation and was given intravenously (IV) normal saline and Perfalgan® (10 mg/mL paracetamol, IV). Surgical intervention and histopathological examination revealed acute suppurative appendicitis, was negative for malignancy, and the presence of *E. Vermicularis* parasite was found within the lumen of the appendix (Fig. 1A). One day postoperation, the patient looked well, with soft abdomen, passed urine, passed gases, and wound dry. After 2 days, the patient was discharged from the hospital on Augmentin (*amoxicillin/clavulanate*) 400 mg suspension (dose 5cc 1 × 3), Flagyl (*metronidazole*) 300 mg (dose 5cc 1 × 2), and paracetamol (dose 5cc 1 × 3). The patient gradually improved after 1 week and was fully recovered after 6 weeks.

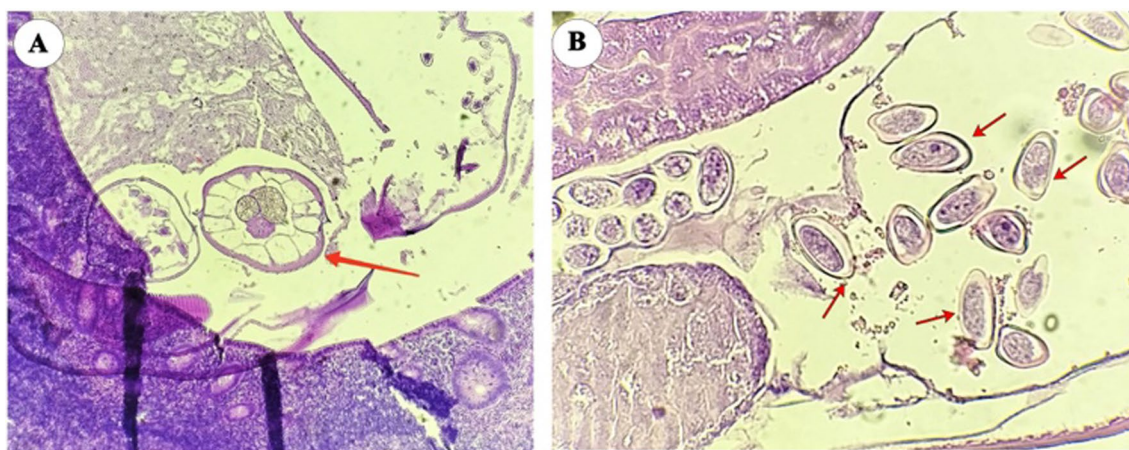


Fig. 1 Histopathological sections stained with hematoxylin–eosin stain showing *Enterobius vermicularis* pinworm in the lumen of the patients appendix. **A** Cross-section of the appendix containing the pinworm (red arrow), in 400× magnification. **B** Longitudinal section demonstrate the presence of a gravid female pinworm with eggs (red arrows) in 400× magnification

Case-2

An 11-year-old Palestinian Arab female, accompanied by her parents, was admitted to the emergency department of Hebron Governmental Hospital (Queen Alia Hospital, Hebron, Palestine). The patient complained of gradual abdominal pain, 12 hours previously with dull aching, not radiated, and associated with nausea but no vomiting and feverish sensation. The medical history obtained from the parents. The patient had no surgical history nor known drug allergies. Upon clinical examination, the abdomen showed no scar, intact hernial orifices, soft lax, localized RIF pain, and suprapubic tenderness with positive rebound and negative rovsing sign.

These symptoms raised suspicions of acute appendicitis, and ultrasonography of abdomen and pelvis revealed normal abdominal organs, minimal-to-mild pelvic free fluids, and thickened and dilated tip of the appendix.

Biochemical analysis showed negative C-reactive protein (2 mg/L, $N=0-6$ mg/L) and normal liver function test. Hematological tests revealed normal eosinophils ($0.07 \times 10^9/L$, $N=0.02-0.62 \times 10^9/L$), mild leukocytosis ($12.8 \times 10^9/L$, $N=4.5-10.6 \times 10^9/L$), and normal neutrophils (62%, $N=50-70\%$). Urine test showed hematuria. On ultrasonography, the appendix could not be visualized, with no free fluids in the surroundings. Based on the clinical examination, diagnosis with acute appendicitis was confirmed, and the patient was kept NPO and administered intravenously 1500 cc pediatric saline over 24 hours. For laparoscopic appendectomy, the following prophylactic medications were given to the patient: Zinnat (cefuroxime axetil) 500 mg (dose 5cc 1 \times 3), Flagyl (metronidazole) 300 mg (dose 5cc 1 \times 3), and Perfalgan (paracetamol IV infusion) 10 mg/mL (dose 1 \times 3). Surgical intervention and histopathological examination revealed peri appendicitis due to *E. vermicularis* parasite (Fig. 1B). After 1 day, the patient looks well with soft abdomen, dry wound, and normal urination, and she passed gases. The patient discharged from the hospital and prescribed Augmentin 600 mg syrup (dose 7cc \times 2) and paracetamol (dose 5cc 1 \times 3). The weekly follow-up of the patient showed marked improvements, and full recovery was achieved after 6 weeks.

Discussion

Acute appendicitis can be caused by *E. vermicularis*, which is a small white nematode infects around one billion people worldwide [7]. Pinworm infestation is the most prevalent helminthic infection in children, affecting up to 50% and 20% of adults [8]. The most common symptom of pinworm infection is nighttime perianal itching, caused by the female pinworm laying eggs.

Since 1898, various reports have linked pinworm to appendix inflammation. In 1919, ileocolic inflammation caused by the parasite was described. Subsequent studies noted cases of pinworm in the appendix, suggesting it can mimic appendicitis [9, 10]. Although rare, with only 1.5% of appendicitis cases involving parasites in developed countries, it is often found incidentally in children aged 7–11 years [6]. Parasitic infection can block the appendix's lumen, leading to inflammation and appendicitis. When pinworms enter the appendix, probably due to high worm burden, they disrupt mucus flow and bacterial balance, causing increased pressure and bacterial growth. This triggers an immune response, resulting in inflammation and classic appendicitis symptoms: fever, elevated white blood cell counts, and lower right abdominal pain and tenderness [11]. Although the association between *E. vermicularis* and appendicitis is debatable and unclear, the worm or its eggs can obstruct the appendiceal lumen leading to acute appendicitis [12].

The diagnosis of *E. vermicularis*-caused appendicitis is frequently made after surgery. Pinworms within the appendix may be seen by the surgeon during an appendectomy. Pathologists can confirm the presence of pinworm eggs or adults through histological examination and treatment involves both. A laparoscopic appendectomy is the main surgical intervention to remove the inflamed appendix and prevent complications such as perforation or abscesses. Antiparasitic drugs such as Flagyl (metronidazole) must be used to treat the underlying pinworm infection after surgery to prevent recurrence [13, 14].

The patient's family and close contacts may also need treatment to control the spread of *E. vermicularis* and prevent infection to the family members. They should follow strict hygiene practices to prevent reinfection. Additionally, students should avoid crowded areas and maintain good hygiene, such as washing hands with soap regularly [15]. It is important to mention that medical doctors evaluate outcomes of clinical and laboratory tests allowing them to rule out other causes of abdominal pain and confirm the diagnosis of appendicitis due to *E. vermicularis*, especially when the presence of pinworms in the appendix is confirmed through histopathological examination.

Conclusion

E. vermicularis infection can cause appendiceal pain without histological inflammation. The two mentioned cases highlight the need to consider *E. vermicularis* infestation in children presenting with right iliac fossa pain, as its clinical signs can mimic acute appendicitis. Precise evaluation of symptoms such as pruritus and eosinophilia in laboratory tests, particularly in children, can prevent

unnecessary appendectomies. This comprehensive approach reduces the risk of complications and improves overall health by effectively treating both acute appendicitis and the parasitic infection.

The learning lessons from these two reports is to consider *E. vermicularis* infestation in the differential diagnosis of right iliac fossa pain in children presenting in emergency rooms. Perianal itching in these cases, primarily nocturnal, usually results from female pinworm migration to the anus for egg laying. Moreover, exercise caution during appendectomy if *E. vermicularis* is suspected, as there is a potential risk of peritoneal contamination.

Abbreviations

NPO	Nothing by mouth
IV	Intravenous
RIF	Right iliac fossa

Acknowledgements

This work has been partially supported by Al-Quds University and Palestinian Ministry of Higher Education, through a grant awarded to OH. The authors thank Palestinian Ministry of Health and specifically the pathology department at Hebron Queen Alia Governmental Hospital for their support.

Author contributions

IA collected samples and drafted the manuscript, AA finalized and improved the manuscript, KS and ZA corrected the final draft, and HB performed the pathological examination. OH revised the manuscript critically and supervised the work. All authors read and approved the final copy of the manuscript.

Funding

Not applicable.

Availability of data and materials

The datasets used during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from Al-Quds University Ethical Committee (reference no.: 381/REC/2024).

Consent for publication

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

Competing interests

The authors declare that they have no competing interests.

Received: 19 July 2024 Accepted: 23 August 2024

Published online: 24 September 2024

References

- Moris D, Paulson EK, Pappas TN. Diagnosis and management of acute appendicitis in adults: a review. *JAMA*. 2021;326(22):2299–311.
- Hamarsheh O. Epidemiology of enterobiasis in Palestine. *Al-Quds J Nat Sci*. 2021;1(1):63.
- Hamarsheh O, Amro A. Epidemiology of parasitic infections in the West Bank and Gaza Strip, Palestine. *Am J Trop Med Hyg*. 2020;102(2):313–7.
- AL-kafaji MSA, Alsaadi ZH. Pinworms infection. *J Med Resh Health Sci*. 2022;5(8):2182–9.
- Jardine M, Kokai GK, Dalzell AM. *Enterobius vermicularis* and colitis in children. *J Pediatr Gastroenterol Nutr*. 2006;43(5):610–2.
- Arca MJ, Gates RL, Groner JI, Hammond S, Caniano DA. Clinical manifestations of appendiceal pinworms in children: an institutional experience and a review of the literature. *Pediatr Surg Int*. 2004;20:372–5.
- Cook GJG. Enterobius infection evermicularis. *Gut*. 1994;35:1159–62.
- Dunphy L, Clark Z, Raja MH. *Enterobius vermicularis* (pinworm) infestation in a child presenting with symptoms of acute appendicitis: a wriggly tale! *BMJ Case Rep*. 2017;2017: bcr-2017-220473.
- Tolstedt GJ. Pinworm infestation of the appendix. *Am J Surg*. 1968;116(3):454–5.
- Symmers WS. Pathology of Oxyuriasis with special reference to Granulomas due to the presence of *Oxyuris vermicularis* (*Enterobius vermicularis*) and its Ova in the Tissues. *Arch Pathol*. 1950. <https://doi.org/10.5555/19512901466>.
- Yilmaz M, Akbulut S, Kutluturk K, Sahin N, Arabaci E, Ara C, Yilmaz S. Unusual histopathological findings in appendectomy specimens from patients with suspected acute appendicitis. *World J Gastroenterol WJG*. 2013;19(25):4015.
- Akkapulu N, Abdullazade S. Is *Enterobius vermicularis* infestation associated with acute appendicitis? *Eur J Trauma Emerg Surg*. 2016;42(4):465–70.
- Taghipour A, Olfatifar M, Javanmard E, Norouzi M, Mirjalali H, Zali MR. The neglected role of *Enterobius vermicularis* in appendicitis: a systematic review and meta-analysis. *PLoS ONE*. 2020;15(4): e0232143.
- Shafiei R, Jafarzadeh F, Bozorgomid A, Ichikawa-Seki M, Mirahmadi H, Raeghi S. Molecular and phylogenetic analysis of *E. vermicularis* in appendectomy specimens from Iran. *Infect Genetics Evol*. 2023;107:105391.
- Moosazadeh M, Abedi G, Afshari M, Mahdavi SA, Farshidi F, Kheradmand E. Prevalence of *Enterobius vermicularis* among children in Iran: a systematic review and meta-analysis. *Osong Public Health Res Perspect*. 2017;8(2):108.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.