



Vestigial Not So Vestigial !-A Surgeon’s View on Appendiceal Enterobiasis

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Abstract

Ever since it first appeared in medical literature, the appendix has always been shrouded in mystery. Although formerly deemed vestigial, recent studies have revealed otherwise. In addition to its function in regulating intestinal immunity, it acts as a host for a variety of parasites. Enterobius vermicularis is the most frequently found parasite in the appendix. In this report, we discuss the case of an 18-year-old female patient who presented with appendicitis-like symptoms and was discovered to have pinworms within the appendix lumen during laparoscopic appendectomy. A few histological and parasitological investigations allowed us to precisely identify the causative agent. Its involvement in the development of acute appendicitis is debated. Enterobius frequently causes appendiceal colic by blocking the appendix's lumen, thus simulating appendicitis. The importance of preoperative diagnostic methods for

identifying enterobius infestation, surgical measures to prevent worm spillage, and postoperative treatment are highlighted in this case study.

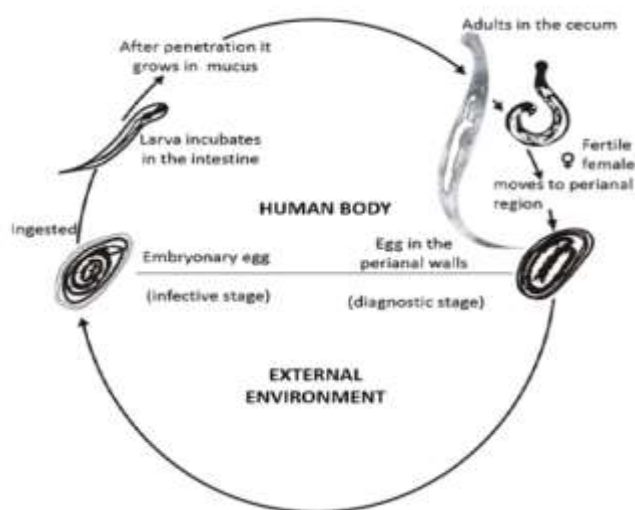
Keywords: Enterobiasis, Enterobius vermicularis, Pinworm, Appendicitis, Appendicectomy

Introduction

Since the emergence of human hominids, E. vermicularis has been successfully established as a parasite in the host organism. Evidence from fossils indicates that they have coexisted for many thousands of years^[1]. Carl von Linné, a Swedish natural scientist, was the first to describe symptomatic pinworm infections, also known as enterobiasis or oxyuriasis (the latter being the older word)^[2]. An estimated 200 million people are infected globally. Though a worldwide pathogen, it is more prevalent in tropical and developing countries^[3], with children aged 5-10 years accounting for about 30% of infections^[4]. The prevalence rates in this age group

having been reported as high as 61% in India [5]. Although this least hazardous of the gastrointestinal nematode helminths is most common in children infection can also occur in adults. Transmission to parents of infected children will happen, thus rates among caretakers of children are particularly high [6]. Lala and Upadhyay found that pinworm infection prevalence is higher in females as seen in our case [7].

It is an obligate parasite with humans as its only known natural host, and it is more common in children than in adults [8]. Humans become infected via the fecal-oral route by consuming food or water contaminated by parasite eggs [9]. Adults are primarily found in the ileum and ascending colon, but can sometimes migrate inside the appendix lumen.



Approximately forty percent of those affected have no symptoms at all. The most typical symptom of enterobiasis is nocturnal perianal pruritis, which occurs as a result of female worms leaving the colon and depositing their eggs on the host's perianal skin [10]. Occasionally, symptoms such as nausea, abdominal pain, or diarrhea may occur. Pinworms can cause an obstruction in the appendix's lumen or trigger a hypersensitivity reaction in the tissues, causing clinical

manifestation of acute appendicitis often described as 'appendiceal colic'.

Semm described the first laparoscopic appendectomy in 1983, making it the most common emergency procedure for suspected acute appendicitis [11]. The relevance of *E. vermicularis* in appendicitis is still debated. Although *E. vermicularis* has been detected in the appendix as early as 1634 by Fabrius [12-13], no reliable evidence of causality has been established. Some early findings indicate that *E. vermicularis* is associated with appendix inflammation [14-15]. Its incidence in appendicitis varies from 0.2 to 4.8 % and seems to affect mostly the young girls [16]. Recent research suggests that an *E. vermicularis* infestation in the appendix might cause symptoms similar to appendicitis, even without histological evidence of acute inflammation [17-20]. While surgery is justified in all cases of appendiceal pain, there is a danger of releasing the pinworms into the peritoneal cavity when a laparoscopic appendectomy is performed. Hence surgeons must be aware of the likelihood of pinworm infestation in the appendix to avoid contaminating the peritoneal cavity with pinworms.

Case Report

An 18 year old female presented to our outpatient department with chief complaint of right lower abdominal pain since 2 days. The pain was associated with anorexia and nausea. She did not specifically mention having perianal pruritis, fever or altered bowel habits. Clinical examination revealed no RIF tenderness. Her blood hemogram revealed mild eosinophilia; all other routine blood investigations were within normal limits. An abdominal ultrasound was done to further evaluate the right lower abdominal pain, which revealed an inflamed appendix as well as mesenteric lymphadenopathy in right iliac fossa. In accordance with

the reports, we decided to perform laparoscopic appendectomy. Intraoperative findings revealed a turgid appendix with minimal hemorrhagic fluid in the pelvis. A pinworm was observed emerging from the appendix lumen after the appendix was cut above the endoloop ligature. The worm was extracted using blunt grasper and was sent for parasitological examination. Another endoloop ligature was applied at the specimen side, obliterating the lumen and preventing any remaining worms from spilling out of the appendix. After the appendectomy, the patient recovered quickly and was discharged on the third postoperative day. She was prescribed 400 mg albendazole once weekly for two weeks. Microscopical parasitological analysis of the worm verified the *E. vermicularis* diagnosis. The histopathology report revealed no worms grossly or microscopically. Submucosa and muscularis propria showed chronic inflammatory infiltrates consisting of lymphocytes, eosinophils and plasma cells favoring Chronic Appendicitis. The causative role of pinworms was not addressed.



Figure 1: Inflamed Appendix with minimal hemorrhagic fluid.



Figure 2: *E. vermicularis* within appendix lumen.

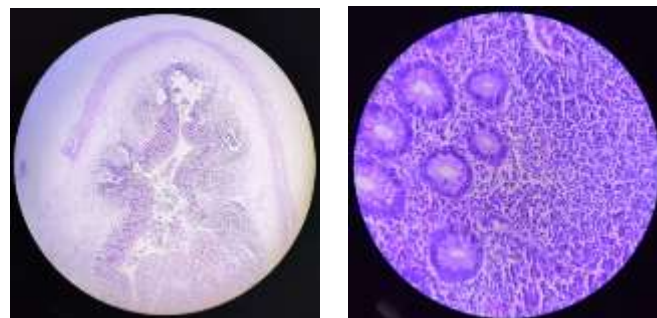


Figure 3 & 4: Histopathological examination of specimen revealing chronic inflammatory infiltrates.

Discussion

For more than a century, the question of whether pinworms are the cause of appendicitis or incidental observations during appendectomy has been debated. According to studies, 0.3–4% of surgically excised appendices had histological evidence of *E. vermicularis* [21]. While most cases have not showed acute inflammation, it may play a part in generating appendiceal discomfort or chronic inflammation after obstruction. Diseases such as acute appendicitis, chronic appendicitis, ruptured appendicitis, gangrenous appendicitis and perforation leading to peritonitis can all be brought on by an enterobius infection [22]. Perianal pruritis being the most common symptom of presentation, other vague symptoms like nausea, vomiting, and pain in the abdomen are typically associated with a high worm burden. Nonetheless,

reports of involvement of extra-intestinal organs such as the kidney, liver, peritoneum, uterus, ovaries, mesentery, and lymph nodes have been made. In their findings, Nordstrand et al. hypothesized that mesenteric lymphadenitis might be a subsequent symptom of an *E. vermicularis* infestation as observed in our case as well [23].

In our instance, we surmised that the patient might have had appendiceal enterobiasis based on the observation of worm expulsion from the distal cut-end of the appendix. Similar example described by Sosin et al. involved the discovery of a pinworm after surgery, leading to a change in the original diagnosis of acute appendicitis to appendiceal colic because of the worms [24]. Before surgery, a greater degree of suspicion is necessary to prevent peritoneal contamination and negative appendectomy.

The management of appendiceal enterobiasis can be divided into three categories: preoperative diagnosis, intraoperative interventions to prevent spillage, and postoperative antihelminthic treatment. The foundation for the pre-operative diagnosis is laid by a complete physical examination, a detailed history, and inflammatory markers. Thorough history of symptoms such as perianal itching should be recorded. In our scenario, neither the patient volunteered nor the admitting surgical team requested this information. The Sellotape test, which has low sensitivity, and saline swabs should be used to try to confirm the diagnosis. Stool routine micro should be sent for parasitological examination. As we can see, high white blood cell counts or eosinophil levels cannot indicate pinworm infection prior to surgery. SII (Systemic Immune-Inflammation Index), a novel measure of inflammation computed using the "platelet x neutrophil/lymphocyte"

formula [25] may serve as a diagnostic biomarker in distinguishing acute appendicitis from appendicitis caused by *E. vermicularis*. An ultrasonogram may potentially identify worms within the appendix but in our case worms were not reported in usg report.

Intraoperatively, the 3-endoloop approach is the standard procedure we employed to secure the appendix base. Instead, Saxena et al. recommended the endostapling approach, which drastically minimizes the amount of exposed mucosal tissue and, as a result, lowers the likelihood of *E. vermicularis* contaminating the peritoneum [26]. As demonstrated in our case, appendix should be cut bit by bit rather than in one rapid stroke, as this will release the retraction at the base and raise the risk of peritoneal contamination. Worms adherent to the mucosa should be thermally desiccated using cautery. To facilitate a seamless specimen transfer without spillage, we advise the use of an Endobag. The port exteriorization approach should be considered an additional option in these circumstances as it prevents any peritoneal contamination because the appendix's base would be separated outside of the peritoneal cavity. Incase if the worms do escape, they can be removed from the peritoneal cavity using endoscopic suction or Bowel grasper.

The patient requires systemic treatment as soon as the worm is found in the operating room in order to prevent the subclinical infestation from spreading to other locations. following regimens are recommended for treating enterobiasis- Albendazole: A 400-mg, one-time dose followed by a repeat dose in 2 weeks OR Mebendazole: A 100-mg, one-time dose followed by a repeat dose in two weeks OR Pyrantel Pamoate: Available over the counter in the United States; Dose of 11 mg/kg up to a maximum 1 gm

given 2 weeks apart. Young pinworms are resistant to treatment, thus two doses of medication, two weeks apart, are recommended. Treating the entire household, whether symptomatic or not is recommended to prevent recurrent infection. Follow-up is vital to ensure that a cure has been attained.

Conclusion

Our case report highlights the significance of keeping a high degree of suspicion regarding an *E. vermicularis* infestation in the vermiform appendix when young female patients come with discomfort resembling "appendiceal colic". For a surgeon while performing an appendectomy, it becomes necessary to take this differential diagnosis into account so that appropriate safety measures can be taken to reduce the risk of peritoneal contamination.

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