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Enterobius Vermicularis Appendicitis: A Case Report

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Abstract
Introduction*: Enterobius vermicularis is one of the commonest parasitic infestations worldwide but its association with acute appendicitis (AA) remains controversial. It is very rarely encountered during appendectomy.* ***Aim:*** *The aim of this paper is to report a case of AA caused by E vermicularis.* ***Material and method****: An 8 year old girl presented with a right lower abdominal pain for the past 2 days. Clinical examination showed abdominal tenderness in the right lower quadrant. Ultrasound examination reported multiple mesenteric lymphadenopathies with non visualized appendix. The patient was diagnosed as a case of suspected acute appendicitis and operated under general anaesthesia. Open appendectomy was done through right grid iron incision on 20th January 2020. Appendix was found inflamed and histopathologically found Enterobius vermicularis.*
Conclusion: *Enterobius vermicularis can inhabit the appendix and induce the signs and symptoms of acute appendicitis with or without actual histopathological acute appendicitis. The treatment is surgical removal of appendix.*
Keywords*: Acute Appendicitis, Enterobius vermicularis, Abdominal Tenderness, Open Appendectomy, Histopathological Examination.*

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I. Introduction

Acute Appendicitis (AA) is among the most common causes of acute abdominal pain which require surgery, and the probability of having this condition in lifetime is approximately 7%[1]. The diagnosis of this condition is considerably difficult, especially due to subtle early symptoms and clinical conditions[2]. Negative appendectomy is observed in 15-30% of cases, where a decision for surgery is made based on the clinical symptoms and findings[3]. Early surgery leads to inadequate evaluation of acute abdominal pain and negative appendectomy, whereas delayed surgery leads to appendicitis perforation complications[4]. Delayed diagnosis leads to various complications, including perforation, peri-appendicular abscess, wound infection and intra-abdominal adhesion[5].

Parasitic infestation represents one of the controversial etiologies for acute appendicitis and their relation has been in debate[6]. However *Enterobius vermicularis* remains one of the commonest parasitic infestations worldwide, with an estimate of 209 million people affected and often it is referred to as *threadworm or pinworm*[7]. Although perianal pruritis is the most common manifestation of *Enterobius vermicularis* (pinworms), it has been reported to be found in different multiple locations, including the vermiform appendix. Regarding appendiceal helminthes, recent literature concentrate mainly on the pathological changes that caused by the presence of intraluminal parasites[8]. In this paper, we present a girl patient with acute appendicitis caused by *Enterobius vermicularis* and go over the literature briefly.

Patient information: An 8-year old girl patient presented to Casualty department with right lower abdominal pain for the past 2 days with concomitant anorexia, nausea and one episode of vomiting. Patient had normal vital signs except mild feverishness. **Clinical findings**: Clinical examination revealed tenderness of right lower quadrant and peri-umbilical areas on palpation. No lump or rebound tenderness found. **Diagnostic assessment**: Complete blood count showed leukocytosis (15600/cu.mm) while other baseline investigations were within normal limits. HBsAg, HCV and HIV were non-reactive. Abdominal Ultrasound reported multiple enlarged lymph nodes largest of size measures 1.5x.8cm in the right iliac fossa with Appendix not visualized. The patient was diagnosed as a case of suspected acute appendicitis (AA).**Therapeutic intervention**: The condition was explained to the patient's parents and informed consent was taken for surgery. Preoperative medications like Antibiotics, i.v fluid (Premolyte-P), Ondansetron, Pantoprazole were given and Patient was taken into operation room. The patient was intubated under general anaesthesia. Vermiform appendix was removed through right grid iron, 2cm long skin incision. The appendix was found mildly inflamed up to distal two-third. The ceacal wall, terminal ileum and the base of appendix looks healthy. Appendix was removed and

sent for histopathological examination. **Gross examination:** Appendix measures 5x0.7 cm. Serosa is mildly congested. Lumen is patent filled with dark brown fecal matter. **Microscopic examination:** Wall is mildly infiltrated by lymphocytes through and through, lumen shows Enterobius vermicularis which is also noticed burrowed in the mucosa.

Fig. 1: Image of removed Appendix

Fig 2: Image of abdominal Incision

Fig. 3: Gross image of removed Appendix.

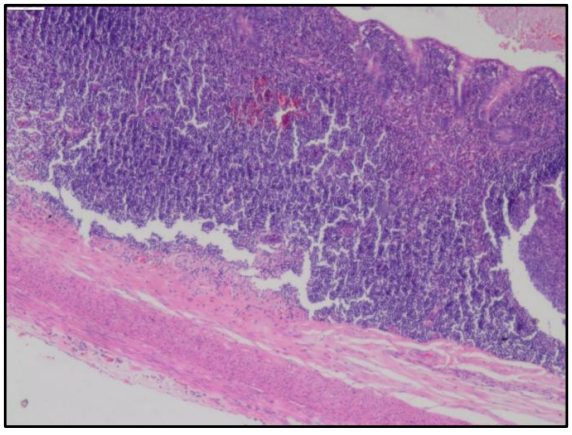

Fig. 4: Microscopic picture of appendiceal wall showing mild lymphocytic infiltration. H&E 40x

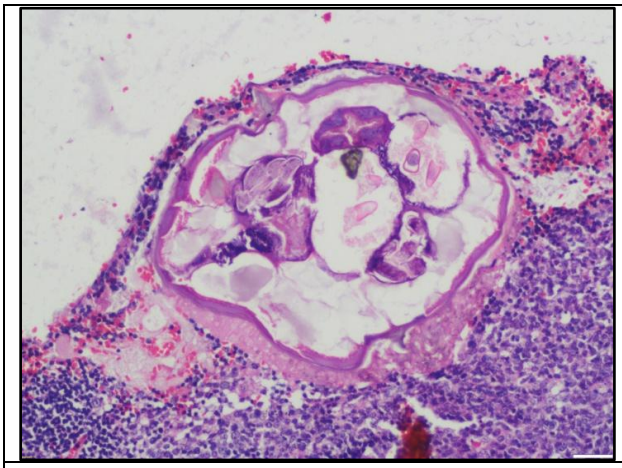

Fig. 5: Cross-section of *E. vermicularis* buried in mucosa of appendix. H&E 40x

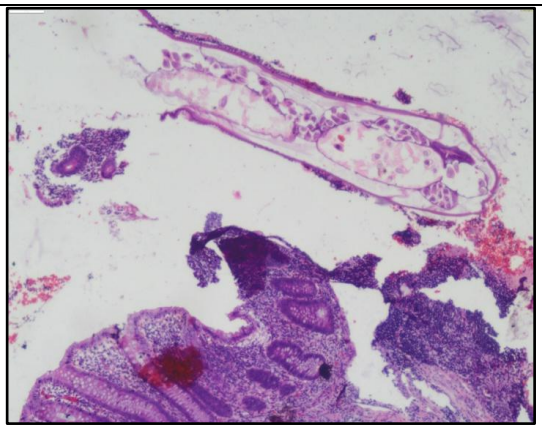

Fig. 6: Longitudinal section of an adult female *E. vermicularis* in lumen of the same specimen showing many eggs. H&E 10x

Follow-up and outcomes: the patient recovered well without any complications and discharged from hospital after two days and called for check-up and skin sutures removal on the 7th day. The histopathological findings revealed Enterobius vermicularis infestation.

II. Discussion

Enterobius vermicularis is known by many names (seatworm, pinworm, threadworm, oxyuriasis) and first description of human infestation nearly dates back 10000years. However, it was Fabius in 1634 who first described involvement of the worm in appendicitis. Once *Enterobius vermicularis* reaches maturity, it stays and reproduces in terminal ileum, caecum, appendix and ascending colon. The life cycle of the male worm ends after fertilization and dies while the female must migrate to the anal canal to lay eggs[9]. The lifespan of *Enterobius vermicularis* is between 2 and 5 weeks. Despite that the relationship between *Enterobius vermicularis* and pathogenesis of appendicitis had been studied for many years, the influence of the parasite to induce inflammation is still unclear. Although, pinworm may have a role in causing appendiceal discomfort or appendiceal chronic inflammation due to obstruction, the majority of cases have no acute inflammation[9]. The belief that Enterobius infestation can cause disease like acute appendicitis, chronic appendicitis and ruptured appendicitis is shared by others, and even more morbid complications like gangrenous appendicitis and perforation resulting in peritonitis[10].

Once the worm is detected in the operation theatre, the patients should be treated for systemic infestation in case there are subclinical infestations elsewhere. The diagnosis of AA is mostly clinical and proper history; physical examination and raised inflammatory parameters help with the diagnosis[11]. To this day, the gold standard treatment for AA is appendectomy and interval appendectomy nowadays is not uncommon[12]. Non operative management of AA has been proposed by several randomized controlled trials and meta-analyses and see it as viable option along with the century standing practice of surgical resection[13]. Appendectomy in these patients is merely a treatment for a complication, but the root cause is still there. Pyrantel pamoate is the drug of choice for *Enterobius vermicularis* treatment. It is an agent that blocks neuromuscular depolarization making the worm undergo spastic paralysis through continuous nicotinic activation, ultimately the worm detaches from the host and consequently will be expelled through defecation[14].Table I[15] reviews the most important reports regarding acute appendicitis and *Enterobius vermicularis*.

Table I: The most prominent reports describing acute appendicitis with *Enterobius vermicularis*

Sl no	Authors	No of cases *E. v*	Year of publication	Country of report	Gender (Female/Male)	Mean age	Inflamed appendix
1	Akkapulu	9	2015	Turkey	7F/2M	31yrs	One case
2	Balci	1	2018	Turkey	Female	35 yrs	One case
3	Budd	38	1987	UK	Not found	-	14 cases
4	Chilkar	1	2016	India	Male	8 yrs	Suppuration
5	Cruz	1	2012	Brazil	Female	29 yrs	One case
6	Dahlstroam	63	1994	Australia		22.8 yrs	23 cases
7	Dunphy	1	2017	UK	Female	10 yrs	None
8	Efared	1	2017	Morocco	Male	21 yrs	One case
9	Efraimidou	1	2008	Greece	Female	15 yrs	None

10	Eleftherios	7	2012	Greece	4F/3M	25 yrs	None
11	Fleming	13	2015	Ireland	-	11.4 yrs	4 cases
12	Habashi	1	2019	Canada	Male	9 yrs	One case
13	Hamdona	30	2013	Palestine	17M/13F	-	23 cases
14	Harris	22	1925	USA	19F/3M	23yrs	-
15	Lala	109	2014	New Zealand		11.6yrs	27 cases
16	Vleeschouwers	1	2013	Belgium	Female	17yrs	None
17	Madhukar	1	2014	India	Female	18yrs	One case
18	Maki	16	2012	USA	-	9.5yrs	Two cases
19	Panadis	1	2011	Greece	Female	52yrs	None
20	Ramezani	144	-	Iran	82F/62M	20.4yrs	76 cases
21	Risio	1	2016	Iran	Female	23yrs	One case
22	Sah	9	2006	Nepal	-	15yrs	3 cases
23	Upadhyaya	6	2015	Nepal	-	-	None

III. Conclusion

Enterobius vermicularis can inhabit the appendix and induce the signs and symptoms of Acute Appendicitis with or without actual histopathological acute appendicitis. The treatment of choice is surgical removal of the appendix.

Compliance with Ethical Standards

Consent: Written informed consent for publication of this case report and any accompanying images was obtained from the patient and her parents.

Conflict of interest: The authors declare that there are no conflicts of interest.

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