Life-threatening ascariasis complication in 4-year-old indigenous child: Prevention is better than cure

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SUMMARY

Soil-transmitted helminths account for a major burden of parasitic disease worldwide. It is particularly endemic in tropical and underdeveloped countries and mainly infects children who live in poor sanitary conditions, poverty, and poor education. We present a case of a 4-year-old Orang Asli (OA) girl who presented to the emergency department (ED) with vomiting, abdominal pain, and abdominal distension. On examination, she was dehydrated and had generalized abdominal tenderness and rigidity with reduced bowel sounds. A plain abdominal radiograph (AXR) and ultrasonography suspected the diagnosis of appendicitis with perforation and revealed roaming intestinal worms possibly causing an intestinal obstruction (IO). Emergency exploratory laparotomy, appendicectomy, and bowel decompression were performed. She was treated with intravenous antibiotics and oral albendazole post-operatively and was discharged on the sixth day of admission. In Malaysia, ascariasis remains highly prevalent in the OA community, which is attributed to inadequate hygiene care and poor sanitary conditions. Prevention of worm infestation is essential in reducing the risk of complications. It can be achieved by scheduled deworming programs. Clinical consultations and home visits from primary care providers are essential in educating, monitoring, and ensuring periodic deworming to this community, hence preventing life-threatening worm infestation complications. It also helps improve OA children's nutrition status and good-condition growth.

INTRODUCTION

Ascariasis is the most common parasitic worm infestation in the world, mainly prevalent in developing countries with tropical climates, primarily affecting children from low socioeconomic status with poor hygiene care and lack of access to basic sanitation.[1,2,3] While most ascariasis are asymptomatic, it can cause serious long-term health issues such as undernourishment, which may impede growth and lead to poor academic performance.[2,3] Furthermore, acute ascariasis complications can be life-threatening, for instance, occlusion of the appendiceal lumen by adult worms or secondary infection of Ascaris eggs, which may result in acute appendicitis and leads to perforation.[4] Hence, we reported a case of acute complication of Ascaris infestation in a four-year-old OA girl when she presented with acute abdominal pain and vomiting. Acute perforated appendicitis with possible intestinal obstruction (IO) was diagnosed by abdominal imaging. Exploratory laparotomy, appendicectomy, and bowel decompression, followed by post-operative treatment with antibiotics and anti-helminthic drugs, cleared the infestation.

CASE REPORT

A 4-year-old OA girl was brought by her parents and presented to the emergency department (ED) with severe abdominal pain and distension for two days associated with nausea and persistent vomiting. The vomitus consisted of food and saliva, with no blood, bile stain, or worm seen. The stool consistency had changed to watery for seven days, and she developed intermittent fever for two days.

On examination, the girl was thin, in pain, and dehydrated. Her temperature was 38.3℃, pulse rate was 124 beats per minute, and blood pressure was 101/58 mmHg. Examination of the abdomen revealed abdominal distension with generalized tenderness and rigidity, and auscultation of the abdomen revealed sluggish bowel sounds. Other systemic examinations were unremarkable. The growth chart plotted fell on the borderline range.

Laboratory tests were done during the initial assessment, and the results as shown in Table I. She was shown to have electrolyte imbalance and hyperlactatemia, indicating dehydration. Blood gas showed no acidosis. She had mild anaemia, and her other blood parameters were normal.

Urgent imaging tests such as abdominal x-ray (AXR) and abdominal ultrasonography were performed in ED. Air-filled loops of dilated bowels were seen in the abdominal radiograph (Figure 1). Dilated bowels with thickened walls throughout the abdomen and blind-ended dilated tubular structures at the right iliac fossa were visualized via ultrasonography of the abdomen. In real-time, multiple mobile echogenic tubular structures were observed within the dilated bowels (Figure 2). Intraabdominal fluid collections were visualized in the right iliac fossa, pelvic and perihepatic regions. These findings suggested acute appendicitis with possible perforation, IO, and worm infestation.

The patient was transferred to a tertiary hospital with an in-house pediatric surgeon for emergency exploratory laparotomy, appendicectomy and bowel decompression. Intraoperatively, contaminated fluid and pus collections were seen within the peritoneal cavity. Bowels appeared dilated

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Table I: Blood investigation results on presentation

Investigations	Result	Unit Type	Reference Range
Haemoglobin	11.8	g/dL	12 – 18
White cell count	7.7	109/L	4 – 10.5
Neutrophils	50.7	%	40 – 75
Lymphocytes	36.2	%	20 – 45
Monocytes	12.8	%	1 – 11
Eosinophils	0.0	%	0 – 6
Basophils	0.3	%	0 - 2
Platelet	261	109/L	150 – 450
Haematocrit	33.6	g/dL	41 – 53
PT	13.8	seconds	11.7 – 15.3
APTT	31	Seconds	30 – 44.4
INR	1.06		1.0 – 1.1

Investigations	Result	Unit Type	Reference Range
Urea	2.8	mmol/L	2.8 – 8.0
Sodium	127	mmol/L	136 – 145
Potassium	3.17	mmol/L	3.5 – 5.1
Chloride	90	mmol/L	98 – 107
Uric acid	434	µmol/L	143 – 359
Calcium	1.9	mmol/L	2.15 – 2.55
Magnesium	0.96	mmol/L	0.66 – 1.07
Phosphate	0.63	mmol/L	0.81 – 1.45
pH	7.418	-	7.35 – 7.45
pCO2	37.3	mmHg	32 – 48
Lactate	2.4	mmol/L	0.5 – 1.6
HCO3	23.4	mmol/L	21.8 – 26.9

Fig. 1: Multiple loops of dilated bowel can be seen on abdominal x-ray

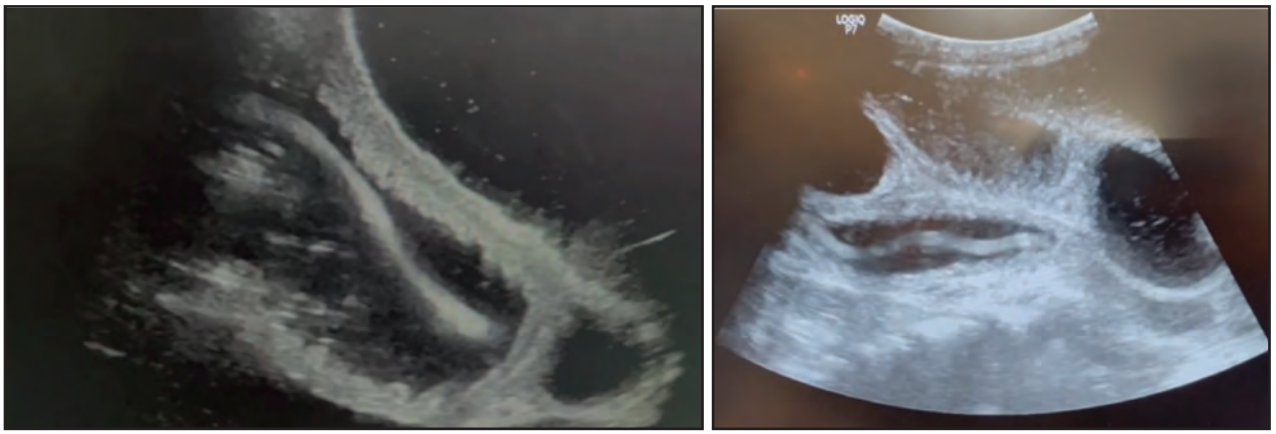

Fig. 2: Several mobile hypoechoic tubular structures with well-defined echogenic walls were seen within the intestines on abdominal ultrasonography. In real-time, the 'structures' were freely moving

and oedematous indicating intestinal obstruction. The appendix was perforated at the body with faecolith within. The base of the appendix and caecum appeared healthy. No parasitic worm was extracted during bowel decompression.

Post-operatively the child stayed in the ward for six days for post-operative care. She received intravenous (IV) antibiotics (cefuroxime 210 mg three times a day and metronidazole 105 mg three times a day) before being converted into the oral formulation for seven days and oral albendazole 400 mg daily for three days.

Upon discharge, she was referred to the nearest health clinic for growth monitoring, periodic deworming and deworming of the entire household. Ascaris infestation awareness counselling was given to the parents, educating them regarding ascaris transmission, improving hygiene care, proper use of sanitation facilities, good dietary habits, and the importance of biannual prophylaxis deworming in the at-risk community, including adults.

DISCUSSION

Roundworms *(Ascaris lumbricoides)*, whipworms *(Trichuris trichiura)* and hookworms *(Ancylostoma duodenale* and *Necator americanus)* are classified as soil-transmitted helminthiasis (STH), and STH is the most common parasitic illness in humans affecting an estimated 2 billion people worldwide with ascariasis infects 1.5 billion individuals.[1,5] It is transmitted by the faecal-oral route via contaminated food, water sources, and soil which another individual then ingests.[3,5] Ascariasis is often associated with poverty, inadequate hygiene, and poor sanitation.[1,2,3]

In Malaysia, the prevalence of STH over the past 40 years saw a dramatic decline nationwide, attributed to the rapid socioeconomic and infrastructural development.[6,7] However, the STH prevalence decline among the OA community, the Indigenous people of Malaysia was much slower, from over 90% in the 1970s to fluctuating between 40% to 80% in recent 2010s studies.[7,8] A review paper by Sinniah, B. et al., a comparison study from 1970 to 2013, stated that among 24.6% of children infected with STH, OA children (44.3%) were the majority.[7] One study in 2014 even showed that as high as 98.4% of OA school children in the Lipis district of Pahang state were found to be infected by at least one intestinal parasite species.[9]

This case report presents a case of ascariasis with perforated appendicitis in an OA child. It also provides vital information on common, inadequate hygiene practices in low socioeconomic areas with low education levels among the OA community that contribute to the spread of STH.

Our patient, a 4-year-old OA girl, lives with her parents in a government-developed OA housing complex with complete basic amenities. The children in the area are usually barefooted when playing outside the house, with poor awareness regarding self-cleanliness before eating their meals, likely exposing them to contaminated soil. The parent reported that the patient had never taken deworming medication since birth. On direct questioning, the parent did not know how STH spreads and the importance of hand washing before meals, regular fingernail cutting, and periodic deworming in preventing STH transmission.

The World Health Organization (WHO) acknowledges that the total elimination of STH from endemic areas is not plausible; thus, efforts should be focused on reducing the prevalence and burden of infection.[3] WHO recommends frequent, large-scale deworming to reduce STH infection and to improve at-risk children's health.[3] Periodic deworming reduces intestinal worm burden to prevent life-threatening complications.[2,3,10] It also improves the long-term health sequelae of undernourished and undergrown children.[2,3] Although prophylaxis chemotherapy only proved to be beneficial for infected individuals, treating the entire at-risk population is more cost-effective and logistically viable, especially in remote OA communities.[3]

Managing and educating at-risk groups regarding the harms of STH can be very challenging to primary healthcare medical personnel. Our patient's parents have defaulted her six-monthly government health clinic appointments and periodic deworming. She lives in a housing complex with appropriate basic amenities, so her ascariasis was likely

attributed to poor personal hygiene practices. The evidence shows that hand hygiene, food preparation techniques, barefooting, suboptimal use of sanitation facilities, and open defecation are risk factors for STH in the OA community, apart from infrastructural factors.[7,8,9,10] Efforts should be directed toward improving the OA community's health literacy and hygiene practices during every encounter either in a clinical setting or home visit. The importance of hygienic practices such as hand washing before eating, wearing footwear, boiling water before drinking, washing and cooking raw food before consumption, discouraging using human faeces for fertilizer, avoiding open defecation, and periodic deworming should be emphasized to prevent STH infestation.[7,9,10]

Symptoms of ascariasis vary heavily and are dependent on intestinal worm burden, thus stressing the importance of regular deworming.[2] Ascariasis could present acutely as pneumonitis, cholecystitis, cholangitis, pancreatitis, intestinal volvulus, appendicitis, and IO, whereas chronic infestation could lead to malnutrition, growth retardation, and impaired cognition.[1,2] Ascariasis-related perforated appendicitis is a rare, life-threatening condition.[3] As in this case, perforated appendicitis likely occurred due to a secondary infection of Ascaris eggs in the appendiceal lumen, leading to inflammation and perforation.[3,5] Although no worm was extracted during bowel decompression, occlusion due to the Ascaris worm was very likely, as evidenced shown by the ultrasonography findings.

Any individuals from the at-risk community presenting with symptoms of acute abdominal pain and IO should warrant high suspicion of ascariasis. AXR only detected intestinal worms when they formed a tangled mass of thick cords, which was absent in this girl.[5] Ultrasonography, initially done to assess the appendix, identified multiple moving tubular structures in real-time, confirming ascariasis. Ultrasonography is an excellent modality to detect the presence of intestinal worms; however, the findings are influenced by many factors, including the worm's orientation relative to the probe, the transducer's resolution, the presence of fluid around the worm, the segment of the worm being examined, and whether the worm is dead or alive during the examination.[5] Ultrasonography could exclude the presence of intestinal worms. In addition, computed tomography (CT) is the alternative to facilitate the detection of parasitic intestinal worms and to identify the etiology of those presenting with acute abdomen.[4,5]

Depending on the concurrent symptoms and the patient's condition, treatment options for ascariasis can be either conservative or surgery. Conservative management with IV fluids, broad-spectrum antibiotics, anti-helminthics, and nasogastric drainage is effective initial therapy.[5] Surgery is necessary if conservative management fails or the patient has complete IO or perforation.[1,5] In her case, she was treated surgically due to the clinical and imaging findings of perforated appendicitis and complete IO.

CONCLUSION

Ascariasis is prevalent in tropical countries and associated with low socioeconomic status, lack of hygiene, and lacking appropriate basic sanitation. At-risk groups, such as the OA community, are susceptible to ascariasis and its complications, warranting a high index of suspicion when presenting with acute abdominal pain and IO symptoms. Initial tests of AXR and ultrasonography are helpful in detecting and diagnosing ascariasis infestation, especially in cases with complications such as appendicitis. These modalities provide vital information on the aetiology, which could guide the management course. Oral albendazole, the drug of choice for treatment and prophylaxis, should be periodically taken by children in the at-risk community to prevent ascariasis and its related morbidity. Primary care providers are essential in educating, monitoring, and delivering periodic deworming and emphasizing good hygiene practices to the community, especially at-risk groups.

CONFLICT OF INTEREST

There was no conflict of interest.

CONSENT

Informed consent was obtained from the patient's mother before the preparation of this case report.

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