



Small bowel obstruction caused by massive ascariasis: two case reports

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Introduction and importance: *Ascaris lumbricoides* is an infestation that affects approximately one-seventh of the world's population. *Ascaris lumbricoides* is a common inhabitant of the intestines of people with low-socioeconomic incomes, especially in underdeveloped countries of the world. *Ascaris lumbricoides* infestation is more prone to infestation with serious complications such as intestinal obstruction, volvulus, intussusception, and intestinal necrosis at higher rates in children than in adults.

Case presentation: The authors present here two cases of small bowel obstruction caused by massive *Ascaris lumbricoides* that were admitted to the pediatric surgery service after completing a clinical and physical examination, and we operated after rehydration. Both underwent surgical resection with an end-to-end anastomosis. The patient was discharged uneventfully with a plan for de-worming treatment in 6 weeks.

Clinical discussion: Ascariasis is a round intestinal worm infestation transmitted by fecal or oral contamination. Eating and excreting ascaris eggs lead to ascariasis and excrete human feces, which contaminate foods, soil, and/or water in unsanitary environments. In contrast, in the first case of this study, the diagnosis was made by ultrasound and erect abdominal radiography, and, in the second case, an abdominal ultrasound result was equivocal and required an abdominal computed tomography scan for confirmation. Treatment of small bowel obstruction by roundworms is usually surgical, but in the absence of signs of peritonitis, medical management can give effective results, even in the case of total obstruction.

Conclusion: The type of surgery undertaken is determined by the results of the laparotomy. If the bowel was found to be intact and the obstruction was at the ileum level, milking worms to the cecum can be done with caution to avoid trauma to the bowel wall. Primary anastomosis after resection of a necrotic bowel segment and removal of the worm bolus is a suitable method for treatment of the ascariasis obstruction.

Keywords: ascariasis, gangrenous bowel, helminthiasis, resection

Introduction

Ascaris lumbricoides worms are caused by ascariasis. It is a disease that would be both chronic and fatal. This parasite is widely distributed around the world, infecting poor people especially in third-world countries and causing a heavy health burden, especially in these countries, and it causes an average of 1.2–10.5% life-year loss per year^[1]. Its eggs are taken into the human digestive system by the enteral route; it is a soil-transmitted helminth. Eggs taken orally, nasally, or anally open in the duodenum, where the hatched larvae infiltrate the circulatory system on the sixth or eighth day, pass to the liver and lungs, and damage them^[2]. Ascariasis lumbricoides infestation affects people of any

HIGHLIGHTS

- *Ascaris lumbricoides* is a common inhabitant of the intestines of people with low-socioeconomic status.
- *Ascaris lumbricoides* infestations are more likely to cause serious complications.
- The mechanisms of obstruction are occlusion of bowel lumen by worms.

age, and it is most common in preschoolers. One of the significant and dangerous effects is the obstruction of the digestive tract by a mass of *Ascaris lumbricoides*^[3]. We present here two cases of small bowel obstruction caused by massive ascariasis. This case report has been reported in line with the SCARE 2020 criteria^[4].

Case presentation

Case 1

A 4-year-old girl, admitted to the emergency department of pediatric surgery with complaints of abdominal distention and pain for 1 week. As per her parents, her history revealed that she had been vomiting with the presence of worms in her mouth for the last 3 days. The colicky pain gradually increased and was initially not associated with vomiting. Her abdomen was distended, diffuse, and tender. The parents levels was of low-education and low-socioeconomic without in- their home sewer service. Irritation, dehydration, tachycardia, abdominal swelling, absence of bowel

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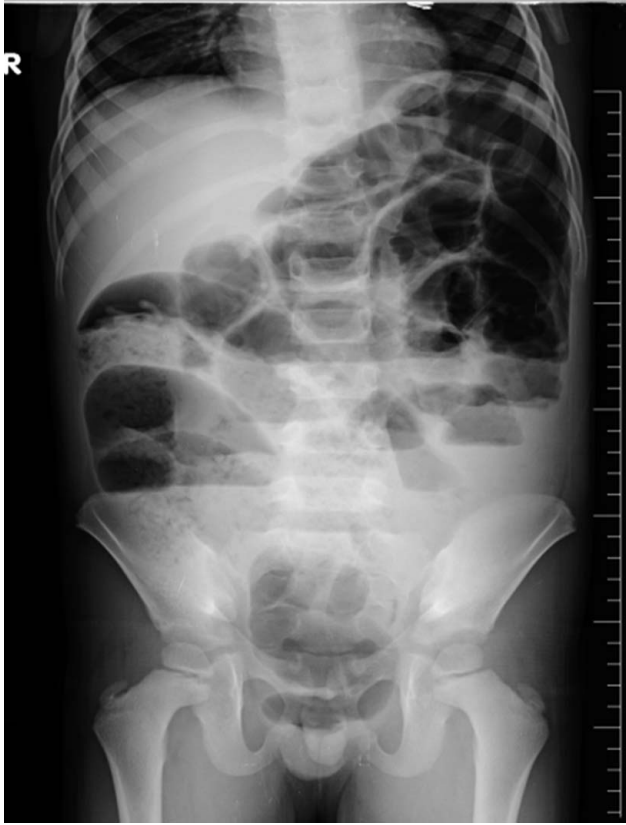


Figure 1. Abdominal radiography presenting multiple air-fluid levels, intestinal loops dilated.

sounds, and colicky pain on palpation and abdominal tenderness were determined on physical examination of the patient. The laboratory results reported were leukocytes of $15\,000 \times 10^9/l$ and C-reactive protein of 100 mg/l . Signs of bowel obstruction with multiple air-fluid levels compatible with ileus were determined in the abdomen radiography (Fig. 1). The child was interned and rehydrated. On the next day of hospitalization, the patient was operated on due to severe ileus by pediatric surgeons. In the abdominal exploration, loops of jejunum and ileum dilated by *Ascaris lumbricoides* were determined. A saucer of Ascaris worms was manually milked out of the enterotomy in the distal ileum. Live ascaris worms had caused complete obstruction of the ileum. Postoperative management was continued with intravenously administered fluids (5% dextrose with 0.45 normal saline), prophylactic antibiotics (intravenous Ceftriaxone 50 mg/kg/day and intravenous Metronidazole 10 mg/kg/8 h for 7 days), and an antihelminthic drug (oral Albendazole 400 mg daily for 2 days). The patient was discharged uneventfully, with a plan to de-worm treatment in 6 weeks.

Case 2

A 5-year-old boy was admitted to the emergency department of the pediatric surgery department with complaints of generalized abdominal pain, vomiting, and constipation for the last 6 days, with no remarkable history. Physical examination revealed with stable vital signs, but distended and painful abdomen of the patient were presented with no palpable mass. In the laboratory

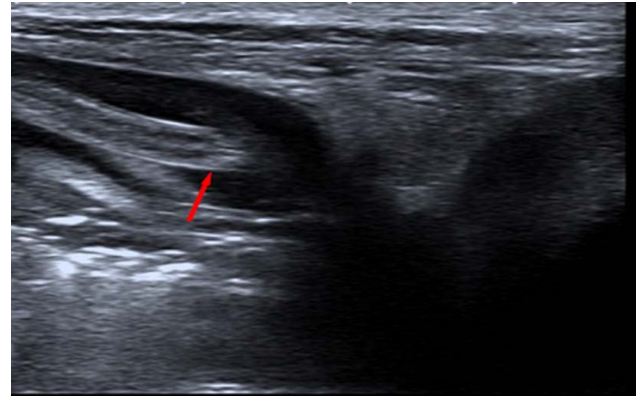


Figure 2. Ultrasound image illustrates a freely movable, long hypoechoic blind-ending tubular structure with a well-defined echogenic wall within the gut lumen (red arrow).

results as leukocyte of $15\,000 \times 10^9/l$ $22\,230 \times 10^9/l$ with mild eosinophilia, C-reactive protein of 85 mg/l , blood glucose of 205 mg/dl were determined, and the others were unremarkable. In the abdomen radiography, multiple gaseous dilatations of intestinal loops were seen, and multiple air-filled tubular structures were determined over several loops of the small bowel in the abdomen. Multiple loops of massively dilated, non-peristaltic small bowel were demonstrated by ultrasound (Fig. 2). Curvilinear pairs of echogenic lines with a relatively hypoechoic central portion within most of these loops were observed, and a computer tomography of the abdomen was ordered for confirmation of ascaris worms. In the arterial phase of multidetector computed tomography (CT), many of the enlarged small intestinal loops were found to contain multiple long tube-like structures, some of which were filled with air. It was also reported that there was wall thickening and contrast enhancement in the terminal ileum (Fig. 3). These CT findings suggested that ascariasis causes mechanical obstruction of the small intestine and causes intestinal ischemia, and the next day, an exploratory laparotomy was performed. Approximately 30 cm of gangrenous ileum up to 10 cm proximal to the ileocecal valve resected, ascaris worms was found to be occluding the whole bowel lumen (Fig. 4). An extensive investigation of the abdomen was performed to exclude other associated pathologies. During the resection of the gangrenous segment, precautions were taken to prevent contamination of the peritoneal cavity. After resection, live and dead ascaris worms were extracted from the ileum and jejunum by milking. The resected bowel ends underwent end-to-end anastomoses. Postoperative management was carried out in the same manner and dosages as in the first patient. The patient was discharged uneventfully after 6 weeks, with de-worming treatment planned.

Discussion

Ascariasis is a round intestinal worm infestation transmitted by fecal or oral contamination. Eating and excreting ascaris eggs lead to ascariasis and excrete human feces, which contaminate foods, soil, and/or water in unsanitary environments. Like other neglected tropical diseases, it is a sign of poor socioeconomic status, sanitation, and hygiene. *Ascaris lumbricoides* are

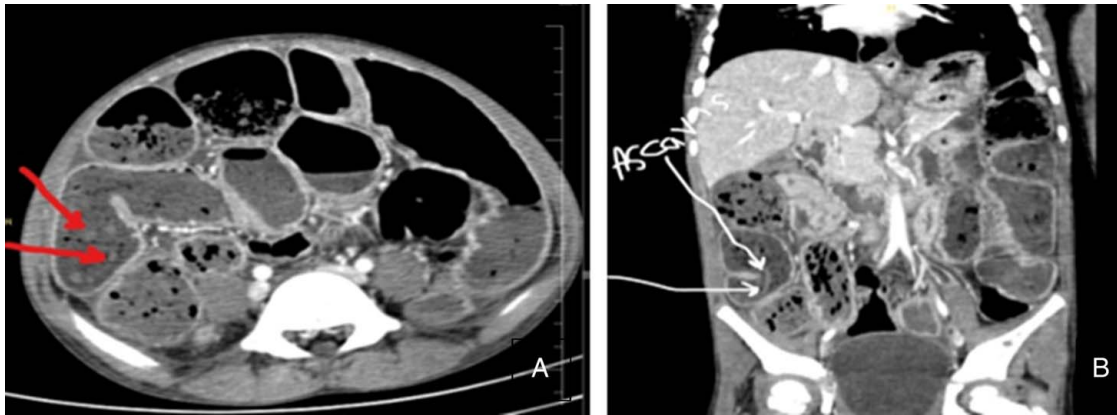


Figure 3. (A and B) Contrast material-enhanced computed tomography scans of the abdomen demonstrate multiple dilated, fluid-filled and gas-filled loops of small bowel. Multiple curvilinear structures, most of which are gas filled, are seen within the bowel.

transmitted by a similar route of transmission of the other worms like whipworms (*Trichuris trichiura*) and hookworms (*Ancylostoma duodenale* and *Necator americanus*), which is referred to soil-transmitted helminthiasis^[5]. They live from the stomach to the ileocecal valve without causing serious symptoms. When the environment becomes intolerable for their lives, they migrate to more suitable areas of the intestinal tract. *Ascaris lumbricoides* may cause serious problems during this migration, including pancreatitis, liver abscess, cholecystitis, intestinal obstruction, and even perforation^[3]. It is relatively rare in developed countries. It is more common in low-income communities and in regions with poor sanitation^[6]. The mechanisms of obstruction are occlusion of the intestinal lumen by worms packed in the distal ileum, as well as the localized volvulus of a segment of the terminal ileum due to the weight of the worms inside. Pressure necrosis caused by roundworms or localized volvulus can cause gangrene or perforation^[7]. Intermittent colicky abdominal pain and partial bowel obstruction are the most common symptoms of *Ascaris lumbricoides* infestation; current cases present similar symptoms^[8]. Both of our patients, have gangrenous segments of the intestine proximal to the

ileocecal valve ~20 cm due to massive *ascaris lumbricoides*. Worms appear as curvilinear soft-tissue-density cords on traditional abdominal radiographs. On an upright radiograph, the usual pattern of air-filled, dilated loops of the small bowel with several air-fluid levels can be seen if intestinal obstruction is present^[8-10]. In an ultrasound, the adult worm will be presented as a hypoechoic tubular structure with well-defined echogenic walls. The worms can be seen making curling movements during a real-time examination. Gastrografin or other intravenous opaque materials are used to diagnose complete intestinal obstruction as well as to relieve the partial obstruction caused by ascariasis. When the worms swallowed opaque fluids, they were opaque for radiographs, thus, worms could be seen as opaque in the intestinal lumen. Hyperosmolar agents by enteral taken, drag fluid to the intestinal lumen. The excess fluid in the vicinity around the worms probably separates them from each other. Hyperosmolar excess fluids also make the worms slippery, enabling them to pass beyond the region of obstruction. In addition, it may also be swallowed by the worms, causing their dehydration and shrinkage^[9]. Thus, enteral ingested hyperosmolar opaque material can also provide medical opening of



Figure 4. (A and B) Multiple *Ascaris lumbricoides* roundworms are seen through the bowel wall on this intraoperative photograph.

ascariasis ileus. Although CT is not the preferred method for diagnosing ascariasis, with soft-tissue windowing, the worms can usually be seen within the bowel lumen^[10]. In suspected cases of bowel perforation, abdominal radiographies and abdomen CT scan detect free intraperitoneal air^[8]. In contrast, in the first case of this study, the diagnosis was made by ultrasound and erect abdominal radiography, and, in the second case, an abdominal ultrasound result was equivocal and required an abdominal CT scan for confirmation. Treatment of small bowel obstruction by roundworms is usually surgical, but in the absence of signs of peritonitis, medical management can give effective results, even in the case of total obstruction^[11]. The type of surgery undertaken is determined by the results of the laparotomy. If the bowel was found to be intact and the obstruction was at the ileum level, milking worms to the cecum can be done with caution to avoid trauma to the bowel wall^[8]. Both of our cases were managed by surgical means. Laparotomy and enterotomy underwent for removing of all *Ascaris lumbricoides* in two cases. Bowels in both cases were gangrenous at the obstruction site, so that is why we performed resection and end-to-end anastomosis.

Conclusion

The type of surgery undertaken is determined by the results of the laparotomy. If the bowel was found to be intact and the obstruction was at the ileum level, milking worms to the cecum can be done with caution to avoid trauma to the bowel wall. Primary anastomosis after resection of a necrotic bowel segment and removal of the worm bolus is a suitable method for treatment of the ascariasis obstruction. Bowels in both cases were gangrenous at the obstruction site, so that is why we performed resection and end-to-end anastomosis. It should be aware of possibility of an ascariasis bolus in intestinal obstruction in children and be cautious in terms of long-term complications.

Ethical approval

There is no need for ethical approval of the case reports in our hospital.

Consent

Written informed consent was obtained from the patient's father for the 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.

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Author contribution

A.Y.A.: wrote the manuscript and corrected the manuscript for its scientific basis. A.M.A.: collected the data for the study. E.M. director of the Department of Pediatric Surgery, and the

consultant surgeon. All authors have read and approved the final manuscript.

Conflicts of interest disclosure

The authors have no conflicts of interest.

Research registration unique identifying number (UIN)

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