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Research Article

SURGICAL COMPLICATIONS OF PAEDIATRIC ASCARIASIS

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A B S T R A C T

Ascaris lumbricoides (roundworm) infestation is very common in the tropical and subtropical countries. Patients with ascariasis can be asymptomatic or may present with different clinical features in the form of simple nausea, decreased appetite, abdominal pain or more severe bowel obstruction, perforation, intussusception, biliary colic etc. Plain abdominal radiographs and ultrasonography (USG) are the quick, safe, noninvasive and relatively inexpensive tools in diagnosing the presence of worms. In this study, we explore the various complications of Ascaris lumbricoides infestation in children, with the aim of highlighting the acute surgical manifestations in endemic areas.

INTRODUCTION

Ascaris lumbricoides (A. lumbricoides) is one of the most common helminthic disease in humans [1].It is estimated that more than 1 billion people are infected with intestinal parasitic infections worl dwide[2–4]. India alone contributes nearly 25% to the total global cases with 220.6 million children in need of preventive chemotherapy [5]. Lack of awareness and resources along with low standards of public health and hygiene makes ascariasis highly endemic in developing countries [6]. The warm and moist climate of tropical and subtropical countries provides the ideal environment for the survival of the parasitic eggs and larvae[7].

Soil Transmitted Helminths (STH) infections rarely cause mortality. Diarrhea, abdominal pain and low hemoglobin levels are the usual outcomes of this infection.
People of all ages are susceptible to infection, with the highest morbidity found in children due to low levels of acquired immunity, small bowel lumen and high exposure to contaminated soil [8].

Acute surgical conditions of the abdomen caused by Ascaris infection includes small intestinal obstruction, volvulus, intussusception and perforation. Perforations usually involves the appendix, Meckel's diverticulum, ileum, rarely through the areas of pre-existing bowel pathologies and sometimes the biliary channels causing obstruction[9-10]. Radiological investigations also play a key role in the diagnosis and management of A. lumbricoides infections [9-11].Our study aims to highlight the acute surgical complications of ascariasis in children residing in high prevalence region.

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MATERIAL AND METHODS

This is a retrospective study of 10 children who came to the emergency of our hospital with complaints of pain abdomen from 1st January 2017 to 30th June 2018.
Besides these 10 children, 3 children with similar complaints were managed conservatively and so were excluded from the study.

RESULTS

The usual presentation of all the patient was late with long standing complaint of pain abdomen. On admission, patients had symptoms of vomiting along with pain and distention of abdomen. On abdominal examination, all the patient had tenderness associated with guarding of the abdominal wall.

Out of 10 patients, 10 (76.93%) patients were boys and 3 (23.07%) patient were girls. The mean age was 6 years 2 months, with peak occurrence at 4 years of age.7 patients (Table-1) presented with "Acute Intestinal Obstruction" (AIO) due to bolus of worm in the ileum. 1 of the patients of AIO had ileocecal intussusception.5 patients developed gangrene of the Ileum. In addition to multiple air fluid levels [Figure2], the plain radiographs revealed "cigar bundle appearance" or "whirlpool". [Figure 1 (A-D)] in 4 patients and this was quite specific for ascariasis. Ultrasonography showed dilated bowel loops with sluggish peristalsis with free fluid in interbowel spaces due to heavy worm infestation of the bowel loops in all the patients except for one in which it showed intussusception. Emergency Exploratory Laparotomy was performed in all the patients with AIO. In 2 patients,obstruction was relieved by milking of worms distally to the colon or after enterotomy

[Figure 3] and the intussusception was reduced manually in 1 patient.

dose given after 15 days. All the family members of the patient were also dewormed.

Table 1 Features of patients with Acute Intestinal Obstruction

S.NO	Age/Sex	Presentation	USG	Plain Radiograph (Abdomen)	Surgical Procedure	Outcome
1	2 Yr/ M	-Pain abdomen -Distension of abdomen	Worm infested and dilated bowel loops with sluggish peristalsis with free fluid in interbowel spaces	Multiple air fluid level	Exploratory laparotomy with milking of worms	Satisfactory
2	4 Yr/ F	-Pain abdomen -Non passage of stool and flatus -Vomiting	Small bowel worm infestation with dilated bowel loops with sluggish peristalsis	Multiple air fluid levels	Exploratory laparotomy with resection of gangrenous bowel loop with re- anastomosis	Satisfactory
3	4 Yr/ M	-Pain abdomen -Vomiting -Non passage of stool and flatus	Worm infested bowel loops with sluggish peristalsis with free fluid in interbowel spaces	Cigar bundle appearance	Exploratory laparotomy with resection of gangrenous bowel loop (one feet proximal to ileocaecal junction) with barrel ileostomy	Satisfactory
4	2 Yr/ M	-Pain abdomen -Distension of abdomen	Heavily infested bowel loops with worms with sluggish peristalsis with minimal free fluid in interbowel spaces	Cigar bundle appearance	Exploratory laparotomy with resection of gangrenous bowel loop (half feet proximal to ileocaecal junction) with barrel ileostomy	Superficial wound infection
5	4 Yr/ F	-Pain abdomen -Distension of abdomen	Worm infested and dilated bowel loops with sluggish peristalsis with free fluid in interbowel spaces	Cigar Bundle appearance	Exploratory laparotomy with resection of gangrenous bowel loop (two feet proximal to ileocaecal junction) with barrel ileostomy	Satisfactory
6	12 Yr/ M	-Pain abdomen -Non-passage of stool and flatus	Dilated bowel loops with sluggish bowel peristalsis with free fluid in intraperitoneal spaces	Multiple air fluid levels	Exploratory laparotomy with enterotomy with removal of multiple impacted worms	Superficial wound infection
7	12 Yr/ M	-Pain abdomen -Distension of abdomen	Dilated bowel loops with sluggish bowel peristalsis with free fluid in intraperitoneal spaces	Cigar bundle appearance	Exploratory laparotomy with release of intussusception with removal of worms by milking	Superficial wound infection

The gangrenous bowel segments in 4 patients were resected andin 1 patient reanastomosis was done and in other 3 proximal ileostomy was created.3 patients (Table 2) presented with features of peritonitis and septicemia. The plain radiograph of abdomen in all these patients showed pneumoperitoneum or gas under the diaphragm. Out of these 2 patients had perforation at the ileum, and 1 had perforation at the tip of Meckel's diverticulum due to closed loop obstruction which resulted in gangrenous perforation. In all the patients emergency Exploratory Laparotomy was done and in the patients with ileal perforation, simple milking of worms distally, primary repair of the perforation and peritoneal toileting was done and proximal loop ileostomy was created [Figure 4]. In the patient with perforation at the tip of Meckel's diverticulum [Figure 5], resection of the gangrenous segment was followed by extraction of worms and after that barrel ileostomy was created.

Post-operative recovery was uneventful and satisfactory in 7 out of the 10 patients. The other 3 patients developed superficial wound infection for which daily dressings were done and antibiotics were modified according to the culture report. All these patients were dewormed on post-operative Day 4 or 5orally with albendazole depending upon the return of bowel functions. Chemoprophylaxis was given to all the patients with 200mg albendazole given to <2 years and 400mg given to >2 years respectively in 2 divided doses withrepeat

Patients were discharged after the removal of the stitches and regularly followed up in the OPD. Till now no recurrence is detected.

DISCUSSION

Soil-transmitted helminth (STH) infections continue to plague large parts of the world with India a significant contributor to the burden of disease [12]. Despite efforts to introduce usage of pit-latrines instead of open defecation, mass deworming program and improvement in water quality and sanitation, STH infections are still prevalent. The eggs of Ascaris are more resilient and can remain in the infective stage for years embedded in the soil[13]. Soil pollution with Ascaris eggs is a major risk factor for the development of infection. As the eggs are very sticky, they readily adhere to raw fruits and vegetables, which are washed with contaminated water or fertilized withcontaminated night soil. They may also circulate inhousehold dust and air where they are inhaled or swallowed [14].Gastrointestinal complications of ascariasis include luminal occlusion, volvulus, perforations, appendicitis and intussusception [9,15].Ascaris worm bolus can initiate intra-luminal obstruction near the ileo-ceacal valve and aggravates spasticity of distal ileum by combined action of endo toxins of worms and host inflammatory response [9,11,15], can also act as lead point for intussusceptions and pivot for volvulus [9,11,16]. In

our study, a similar trend of acute surgical complications associated with ascariasis is reported.

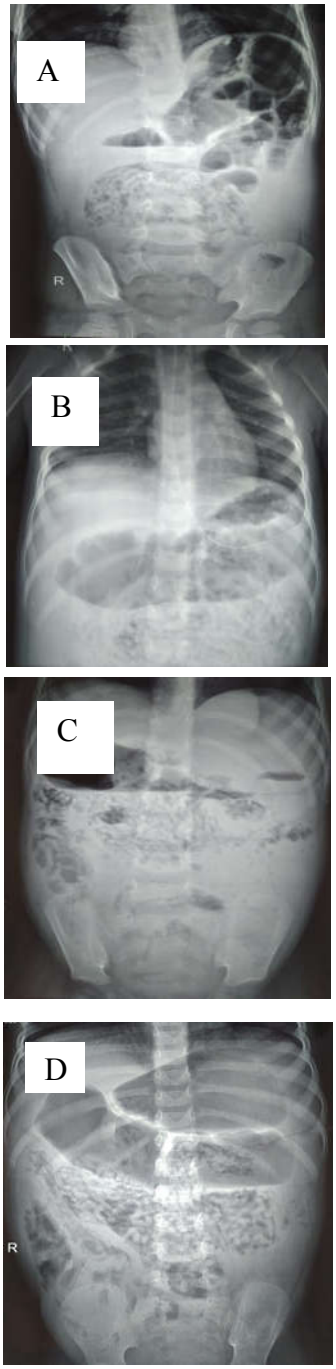

Figure 1 (A-D)- Cigar Bundle Appearance or "Whirlpool Sign" in 4 Patients of AIO

Figure 2 Multiple Air Fluid Levels

Figure 3 Extraction of worms by Enterotomy in AIO

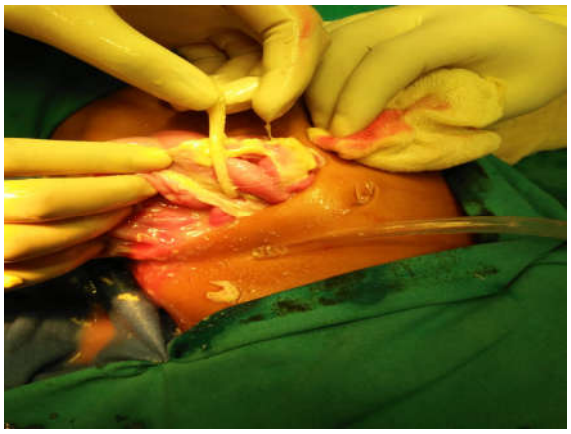

Figure 4 Worms extracted throughperforation site

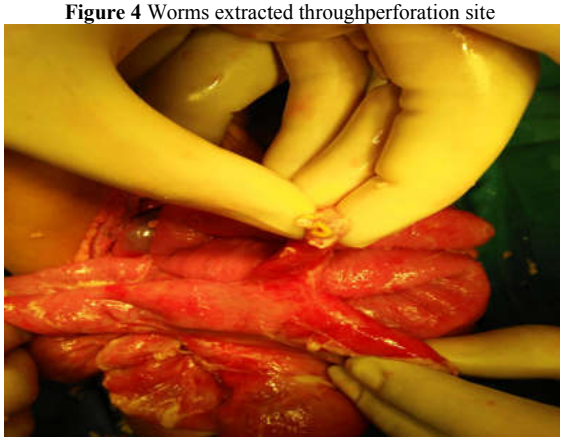

Figure 5 Worm Extracted from perforated Meckel's diverticulum

Although most series report intestinal luminal occlusion as the most common presentation which ranges from 50% to 65% [15], in our study the presentation came out to be 70% of the total cases, and it is probably because the cases which were managed conservatively were not taken into consideration and only those cases which required a surgical intervention were included in the study. The incidence of intussusception has been reported in approximately 2% [15]of presentation of intestinal ascariasis and its cause has been attributed to the hyperperistalsis of worm bolus and distal ileal muscle receptor blockade by the toxins released by the worm [15]. In our study 1 patient had intussusception which resulted in intestinal obstruction.

Intestinal perforation due to ascariasis is thought to be rare due to distensibility of lumen of the intestines and it usually occurs when worms obstruct the lumen of blind ending structures

such as appendix or Meckel's diverticulum or when the bolus of worm initiates intra-luminal obstruction near the ileo-caecal valve. In our study, out of 3 patients who had perforation, 2 had perforation due to intra luminal obstruction of bowel near the terminal ileum, and 1 patient had perforation in Meckel's diverticulum due to blind loop obstruction.

Ascaris lumbricoides is highly wandering in nature. They migrate through the ampulla of Vater and occasionally enter and block pancreatic and bile ducts causing varied surgical complications of the hepatobiliary and pancreatic system [10,11,15,17], causing malabsorption of vitamin A and reduction of lactose digestion.

Diagnosis of ascariasis requires a meticulous approach. Clinical symptoms and hematological investigations along with plain radiographs and ultrasound of abdomen helps to detect the disease process.

Plain radiographs of abdomen show radiolucent areas along with cigar bundle appearance or "whirlpool" sign, pneumoperitoneum or gas under the diaphragm in case of perforation and multiple air fluid levels in case of heavy worm infestation [15,22-24]. In our study, 4 patients presented with cigar bundle appearance or "whirlpool" sign [Figure1 (A-D)]. Though not very sensitive, this sign can be considered **very specific** for intestinal ascariasis.

Table 2 Features of patients with Perforation Peritonitis

S.NO	Age/Sex	Presentation	USG	Plain Radiograph (Abdomen)	Surgical Procedure	Outcome
1	8 Yr/ M	-Pain abdomen -Distension of abdomen -Non passage of stool and flatus	Worm infested bowel loops with coarse interbowel echoes within it	Gas under the diaphragm	Exploratory laparotomy with milking of worms with primary repair of perforation with proximal loop ileostomy with peritoneal toileting	Satisfactory
2	10Yr/ F	-Pain abdomen -Non passage of stool and flatus -Vomiting -Distension of abdomen	Small bowel worm infestation with dilated bowel loops with free fluid in interbowel spaces	Gas under the diaphragm	Exploratory laparotomy with worm removal by milking with primary repair of perforation with proximal loop ileostomy	Satisfactory
3	3Yr/ M	-Pain abdomen -Vomiting -Non passage of stool and flatus -Distension of abdomen	Worm infested and dilated bowel loops with sluggish peristalsis with free fluid in interbowel spaces	Gas under the diaphragm	Exploratory laparotomy with resection of perforated Meckel's diverticulum with barrel ileostomy	Satisfactory

This leads to growth retardation, undernutrition, impaired cognitive functions and low educational achievements in children [18,19]. Biliary ascariasis incidence varies from 10% to 19% of ascariasis related hospital admissions and usually it is found prior to endoscopic sphincterotomy and bilioenteric anastomosis and biliopancreatic ascariasis is predisposed due to female sex [11,17,20]. Presence of A. lumbricoides in gallbladder is rare because the cystic duct is narrow and tortuous [20]. Hepatobiliary ascariasis usually presents with symptoms of biliary colic (56 to 98%) along with non-specific features like nausea, vomiting, abdominal pain, and urticaria. Cholangitis (16 to 25% of patients), acute cholecystitis (acalculous cholecystitislittle less than 10% of the cases), calculi (10 to 66% of patients), stricture, hepatic abscess and Acute pancreatitis (4 to 36% of patients)are the other complications of hepatobiliary ascariasis and are confirmed easily with ultrasound [11,17,20,21]. In endemic areas, Ascaris is a frequent etiology for liver abscess and Javid and colleagues describe 510 patients with liver abscess in whom 74 (14.5%) patients had ascariasisas the source ofinfection[17]. Sensitivity of ultrasound in pancreato-biliary ascariasis varies from 25%-91% [17]. Conservative management is mainstay of treatment in these conditions with response ranging from 83%-90% [11,17]. Endoscopic retrograde cholangio-pancreatography and extraction of worms without sphincterotomy or surgery can be undertaken for hepatobiliary and pancreatic ascariasis when the conservative management for the same fails [11,17,20]. Most of these complications of ascariasis have been reported in adults.

It can be taken as an indicator of heavy disease burden since one of the three patients treated conservatively also had "whirlpool sign".Ultrasound also plays an important role and key ultrasound findings suggestive of ascariasis are the following- (a) a thick echogenic strip with a central anechoic tube; (b) multiple long, linear, parallel echogenic strips without acoustic shadowing in longitudinal (railway track) and transverse (bull's eye) views; (c) overlapping longitudinal interfaces in the main bile duct due to coiling of a single worm or several worms in the CBD (helmenthinoma) [9,11,21,23,24]. The sinus movement of the worms inside the gallbladder and bile ducts is the pathognomonic of ascariasis [17]. In our study, ultrasound findings in all the 7 patients of AIO showed dilated bowel loops with sluggish peristalsis with free fluid in interbowel spaces due to heavy worm-infested bowel loops [Table 1].

Early diagnosis, adequate resuscitation and monitoring and early surgical intervention in patients with toxemia and features of bowel obstruction and peritonitis helps in salvaging bowel and thus reduces morbidity and mortality in the patients. Most of the morbidity and the mortalities are usually seen in children presenting with gangrene of the bowel due to obstruction and peritonitis [9,15] as was the case in our study in which 3 patients of obstruction developed superficial wound infection for which daily dressing was done and antibiotics modified according the culture report. No mortality was observed in our study.

Reinfection [9,17]occurs frequently with more than 80% of the cases getting reinfected within 6 months in some endemic areas. Due to this, deworming is required to be done periodically and repeatedly.

CONCLUSION

In developing countries like India, ascariasis infestation is the common helminthic disease which presents with wide spectrum of clinical presentations, one of which can be acute abdomen. If the history and examination are doubtful then, plain radiographs of abdomen along with high resolution ultrasonography can be helpful in diagnosing the presence of worms and its complications. Proper intervention prevents high morbidity and mortality associated with obstruction and perforation. Surgery is the mainstay of management in acute surgical complications.

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References

1. Pfefferman R. Ascariasis of biliary system. Arch of Surg 1972; 195: 118.
2. Bethony JR, Brooker S, Albonico M, Geiger SM, Loukas A, Diemert D, *et al*. Soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm. Lancet. 2006; 367:1521–32.
3. Crompton DW. Ascaris and ascariasis. Adv Parasitol.2001;48:285–375.
4. De Silva NR, Brooker S, Hotez PJ, Montresor A, Engels D, Savioli L. Soil transmitted helminth infections: updating the global picture. Trends Parasitol. 2003;19(12):547–51
5. http://www.who.int/neglected_diseases/preventive_che motherapy/sth/db/?units=minimal&region=all&country= all&countries=all&year=all Accessed on 31 Oct 2015
6. Khuroo MS, Zargar SA: Biliary Ascariasis-a common cause of biliary and pancreatic diseases in an endemic area. Gastroenterology 1985; 88: 418-23.
7. Brooker S, Clements AC, Bundy DA. Global epidemiology, ecology and control of soil-transmitted helminth infections. Adv Parasitol. 2006; 62:221–61.
8. Galvani AP. Age-dependent epidemiological patterns and strain diversity in helminth parasites. *J Parasitol*. 2005; 91:24–30.
9. Mishra PK, Agarwal A, Joshi M, Sanghvi B, Shah H, Parelkar SV. Intestinal obstruction in children due to Ascariasis: A tertiary health centre experience. *Afr J Paediatr Surg*. 2008; 5:65-70. [PubMed: 19858669]
10. Wani I, Snabel V, Naikoo G, Wani S, Wani M, Amin A, *et al*. Encountering Meckel's diverticulum in emergency surgery for ascaridial intestinal obstruction. *World J Emerg Surg*. 2010; 5:15. [PMCID: PMC2908070] [PubMed: 20529382]
11. Mukhopadhyay M. Biliary ascariasis in the Indian Subcontinent: A study of 42 cases. Saudi J Gastroenterol. 2009; 15:121-4. [PMCID: PMC2702965] [PubMed: 19568577]
12. Khuroo MS, Zargar SA, Mahajan R. Hepatobiliary and pancreatic ascariasis in India. Lancet. 1990; 335:1503–6.
13. Villamizar E, Mendez M, Bonilla E, Varon H. De onatra S. Ascaris lumbricoides infestation as a cause of intestinal obstruction in children: experience with 87 cases. J Pediatr Surg. 1996;31(1):201–4.
14. Lobo DA, Velayudhan R, Chatterjee P, Kohli H, Hotez PJ. The neglected tropical diseases of India and South Asia: review of their prevalence, distribution, and control or elimination. PLoS Negl Trop Dis. 2011;5: e1222
15. Gilgen D, Mascie-Taylor CG. The effect of anthelmintic treatment of helminth infection and anemia. Parastol 2000; 122:10522.
16. O'lorcain PHC, Holland CV. The public health importance of Ascaris lumbricoides. Parasitology. 2000;121: S51–71.
17. Esposito C, Settimi A, De Marco M, De Fazio C, Giurin I, Savanelli A, *et al*. Surgical complications of ascariasis in children. *J Pediatric Surg Spec*. 2008;2(3):8-12. Available from: https://www.jpedss.com/Volume2,3-December-2008/eArt53.php.
18. Refeidi A. Live Ascaris lumbricoides in the peritoneal cavity. Ann Saudi Med. 2007; 27:118-21. [PubMed:17356318]
19. Sanai FM, Al-Karawi MA. Biliary ascariasis: Report of a complicated case and literature review. *Saudi J Gastroenterol*. 2007; 13:25-32. [PubMed: 19858609]
20. Dickson R, Awasthi S, Williamson P, Demellweek C, Garner P. Effects of treatment for intestinal helminth infection on growth and cognitive performance in children: systematic review of randomised trials. BMJ. 2000; 320(7251):1697–701.
21. Drake LJ, Jukes MCH, Sternberg RJ, Bundy DAP. Geohelminth infections (Ascariasis, Trichuriasis, and hookworm): cognitive and developmental impacts. Semin Pediatr Infect Dis. 2000; 11:245–51.
22. Puneet, Tiwary SK, Singh S, Agarwal S, Khanna AK. Gallbladder ascariasis: A Case Report. *The Internet J* Parasitic Dis[Internet] 2006;1(1) Available from: https://www.ispub.com/journal/the-internet-journal-of-parasitic-diseases/volume-1-number-1/gallbladder-ascariasis-a-case-report
23. Sharma UK, Rauniyar RK, Bhatta N. Roundworm infestation presenting as acute abdomen in four cases-Sonographic diagnosis. *Kathmandu Univ Med J*. 2005; 3:87-90.
24. Yetim I, Ozkan OV, Semerci E, Abanoz R. Rare cause of intestinal obstruction, Ascariasis lumbricoides infestation: Two case reports. Cases J. 2009:2:7970. [PMCID: PMC2740073] [PubMed:19830032]
25. Gangopadhyay AN, Upadhyaya VD, Gupta DK, Sharma SP, Kumar V. Conservative treatment for roundworm intestinal obstruction. *Indian J Pediatr*. 2007:74:1085-7. [PubMed: 18174642]
26. Mir IA, Nazir Wani NA, Ahnager AG, Saleem K, Patnaik R.Radio-imaging in ascariasis. JK Science: Journal of Medical Education and Research [Internet] 2002:4:158. Available from: https://www.jkscience.org/archive/Volume43/Radio-imaging in ascariasis