Mechanical small bowel obstruction in children at a tertiary care centre in Kashmir

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ABSTRACT

Background: Small bowel obstruction is the commonest surgical emergency encountered in childhood. We observed that intestinal obstruction caused by ascariasis is one of the leading causes of death in our children and consumes a major portion of our hospital resources. Other causes include intussusception, adhesions, volvulus, hernias, and worm obstruction. The aim of this study was to analyze the presentation, diagnosis, management of mechanical bowel and complication of obstruction in children. **Patients and Methods**: The study was conducted from Jan 2005 to Dec 2007 in the Department of Pediatric Surgery at Sheri- Kashmir Institute of Medical Sciences, Srinagar, Kashmir. All patients who presented in the emergency department with the diagnosis of intestinal obstruction were recruited. Patients with a dynamic obstruction were excluded from the study. Diagnosis was based on history and radiological findings. Data regarding the type of management, operative findings, operative procedure and post-operative complications were collected. **Results:** There were 207 patients admitted for intestinal obstruction. Males and females were equally affected. Most of the children (55%) were aged 3–5 years. The causes of obstruction included ascariasis 131 (63.2%), adhesion 23 (11.1%), intussusception 21 (10.1%), obstructed hernia 17 (8.2%), and volvulus 11 (5.3%). One hundred twenty-six patients needed an operative intervention and 81 were treated conservatively. The operative procedures performed included enterotomy in 37 (29.3%), milking of worms in 18 (14.2%), resection anastomosis in 31 (24.6%) and adhesiolysis in 13 (10.3%). Appendicular perforation was seen in 4 (1.9%) and worm in gall bladder in 1 (0.5%) patients. Surgical complications were wound infection in 18 (14.2%), burst abdomen in 5 (3.9%) and fecal fistula in 3 (2.3%) patients. **Conclusion:** Intestinal obstruction is associated with considerable morbidity and mortality in children. Obstruction by ascariasis constituted the majority of intestinal obstruction in this study. Efforts should be made to eradicate ascariasis in endemic areas through proper sanitation, hygiene and use of antihelminthics.

Key words: Ascariasis, intestinal obstruction, round worm

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INTRODUCTION

Small bowel obstruction is the commonest surgical emergency encountered in childhood. Causes of mechanical intestinal obstruction in children include intussusception, adhesions, volvulus, hernias and worm obstruction. In developed world the commonest cause of intestinal obstruction in children is adhesive obstruction,[1] but in the developing world worm is the leading cause of bowel obstruction in children. Ascariasis is a common infestation in tropical countries caused by poor hygiene and low socioeconomic conditions. Although most of the cases are managed conservatively, many cases require surgical intervention with attendant morbidity and mortality.[2] Globally 1.5 billion people are infested with ascariasis which constitutes about 25% of world population.[1,2] In India 70% of children are infested with ascariasis but in Kashmir this figure is above 78%.[3] Thus this study was undertaken to analyse the diagnosis, management, type of surgical intervention and surgical complications in patients of mechanical small bowel obstruction.

MATERIAL AND METHODS

The study was conducted from Jan 2005 to Dec 2007, in the Department of Pediatric Surgery at Sheri-Kashmir Institute of Medical Sciences Srinagar, Kashmir, which is a tertiary care centre in India. This was a prospective study involving children aged 3–14 years, who were admitted and managed for intestinal obstruction. A thorough history was taken and physical examination performed including digital rectal examination. Baseline investigations including haemogram, serum electrolytes, stool examination and X-ray abdomen erect

and supine, ultrasound abdomen were performed in each case. Contrast enhanced CT scan was performed if a mass lesion was suspected. Contrast study was not routinely used; it was used only if diagnosis of malrotation, intussusception suspected.

Surgical intervention was undertaken as per Dayalan,s and Louw's criteria.[4,5] The modality of treatment and surgical complications were recorded. Each patient was followed up weekly for 4 weeks, then monthly for 3 months and 3 monthly thereafter.

RESULTS

There were 207 patients admitted for intestinal obstruction (M:F=1:0.8). Most of the children (114/207: 55%) were aged 3–5 years [Table 1]. Worm obstruction was the commonest cause of obstruction in 131 (63.2%) patients [Table 2]; other causes included adhesion obstruction in 23 (11.1%), intussusception in 21 (10.1%), obstructed hernia in 17 (8.2%) and volvulus in 11 (5.3%) cases. Adhesion obstruction was the second commonest aetiology in 23 (11.11%) patients; the causes of the adhesions were postoperative in 11, postinflammatory in 7, post-traumatic in 3, and unknown in 2 patients. The intussusception was idiopatic in 18 (85.71%); the known causes in the rest included Meckel's diverticulum in one (4.76%), inverted appendiceal stump in one (4.76%) and post-operative intussusception following operation for ileo-ileal intussusception in one (4.76%). Majority of the intussusceptions were of ileocolic type. The leading points initiating intussusceptions were seen in 14.28% children of intussusception only.

Obstructed hernias ranked fourth in the list. Obstructed inguinal hernias were the most commonly seen. Obstructed right inguinal hernia was present in 8 of 14 (57.14%) and left in 6 of 14 (42.85%) patients. There were 2 cases (11.76%) of obstructed internal hernias (one through congenital mesenteric rent and another through congenital defect in transverse mesocolon) and one case (5.88%) of obstructed umbilical hernia.

Small bowel volvulus was fifth in the list, occurring in 11 (5.31%) patients. There were 3 cases (27.27%) of primary volvulus and 8 cases (72.72%) of secondary volvulus. The secondary causes were adhesive band in one, Meckel's band diverticulum in one, wide mesenteric defect in one and round worms in five.

Other infrequent causes were congenital bands in 2 (Meckel's band diverticulum and a band between ascending colon and terminal ileum, Figure 1), tumour obstruction (non-Hodgkin lymphoma) in one and enterogenous cyst in one, accounting for 0.96%, 0.48% and 0.48% of patients, respectively.

Abdominal pain was the most common complaint, followed by vomiting [Table 3]. One hundred twenty-six (60.8%) patients needed surgical intervention for intestinal obstruction [Figure 2]. Enterotomy [Figure 3] with removal of the worm masses was the commonest procedure performed in 37 (26.9%) patients; worms were successfully milked out in 18 (28.1%) and resection and anastomosis were carried out in 31 (24.60%) patients [Table 4].

The commonest post-operative complication was wound infection in 18 (14.2%) patients [Table 5]. The other

Table 1: Showing age, sex and demographic distribution of children with intestinal obstruction. (n=207)

Age in years	No. of children	Male/Female	Rural/Urban
3–5	114	47/67	83/31
6–8	51	27/24	35/16
9–11	33	13/20	21/12
12–14	9	5/4	5/4
Total	207	92/115	144/63

Table 2: Etiology of mechanical bowel obstruction in children (n=207)

Etiology	No. of patients	Percentage
Round worms	131	63.2
Adhesions	23	11.1
Intussusception	21	10.1
Obstructed hernia	17	8.2
Volvulus	11	5.3
Congenital bands	2	0.9
Tumour obstruction	1	0.4
Enterogenous cyst	1	0.4

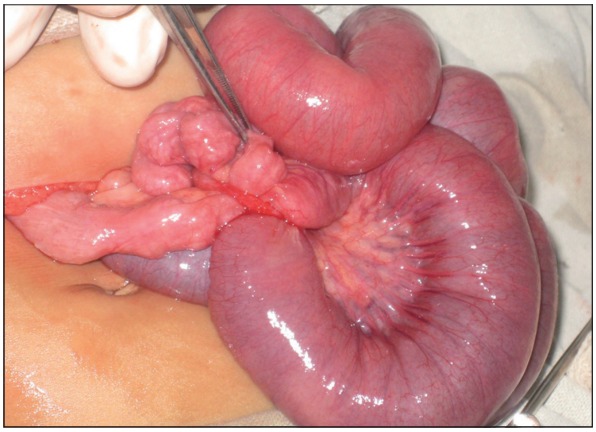


Figure 1: Intestinal obstruction due to congenital band.

Table 3: Presenting symptoms and signs in worm obstruction (n=131)

Symptoms	No. of patients (%)	Signs	No. of patients (%)
Abdominal pain	128 (97.7)	Tachycardia	50 (38.1)
Vomiting	97 (74)	Dehydration	43 (32.8)
Abdominal distension	84 (64)	Visible peristalsis	59 (45)
Constipation	79 (60)	Palpable mass	48 (36.6)
Fever	18 (13.7)	Tenderness	90 (68.7)
		Borbyrigmy	59 (45)

Table 5: Morbidity and mortality (n=126)

Complication	Morbidity (%)	Mortality (%)
Wound infection	18 (14.2)	
Burst abdomen	5 (3.9)	
Faecal fistula	3 (4.6)	2 (3)
Septicemia	7 (10.9)	3 (4.6)
Acute renal failure	1 (1.5)	1 (1.5)

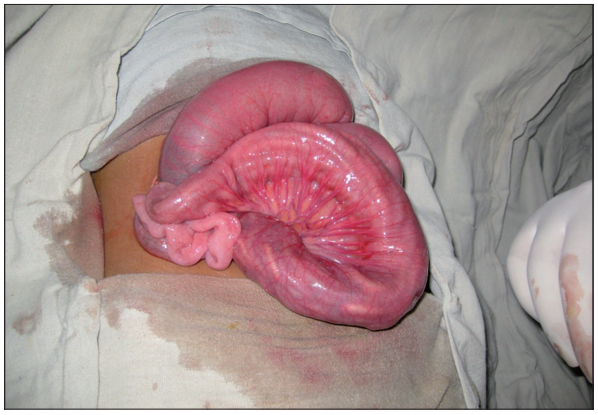


Figure 2: Jeujenum tightly packed with round worms.

complications were sepsis in 7 (5.55%), burst abdomen in 5 (3.9%), anastomotic leak with free round worm in peritoneal cavity [Figure 4] and enterocutaneous fistula in 3 (2.38%) and acute renal failure in 1 (0.79%) patient. Two patients with enterocutaneous fistula were reoperated and had reanastomosis, but only one had a successful outcome.

There were five deaths with overall mortality rate of 2.4%. Sepsis with shock was the commonest cause of death occurring in three patients. Two deaths complicated enterocutaneous fistula, one due to a high output fistula and other due to fecal peritonitis.

DISCUSSION

Ascaridial obstruction was the commonest etiology in our study, which is at varience with most observations in western literature where adhesion obstruction is the commonest etiology.[6,7] Our observations are also in variance with other Indian series.[4-9] Poor hygiene,

Table 4: Type of operative procedure (n=126)

Operative procedure	No. of patients (%)
Milking of worms	18 (14.2)
Enterotomy	37 (29.3)
Resection anastomosis	31 (24.6)
Adhesiolysis	13 (10.3)
Reduction of intussusception	10 (7.9)
Reduction of inguinal hernia	9 (7.1)
Untwisting of volvulus	3 (2.3)
Right hemicolectomy	2 (1.5)
Exicion of congenital band	1 (0.7)
Meckels diverticulectomy	1 (0.7)
Repair of umbilical hernia	1 (0.7)

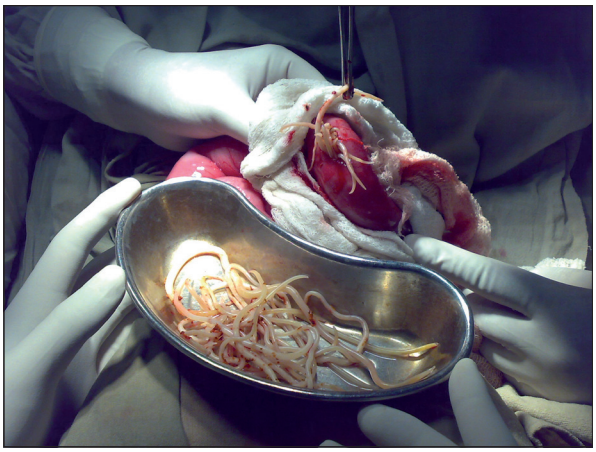


Figure 3: Removal of worms after enterotomy. Note placement of packs to prevent contamination.

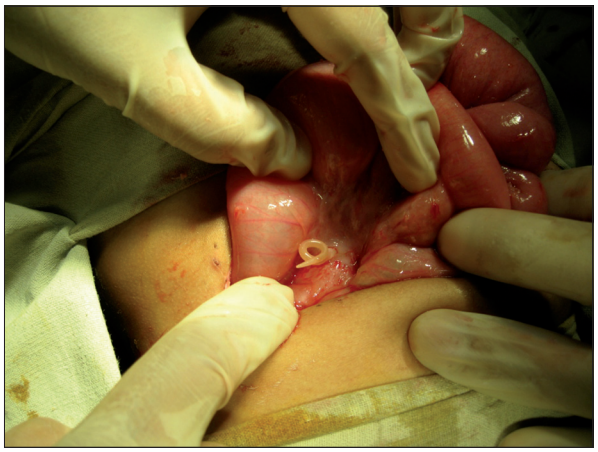


Figure 4: Round worm in peritoneal cavity after anastomotic leak.

improper sanitation and waste disposal encourage the multiplication of Ascaris Lumbricoides in places like our setting. Adhesion obstruction ranked second in the present series, which is similar to the report by Festen *et al.*[10] Intussusception was third in the list of etiology of mechanical small bowel obstruction in children in our setting. This findings contrast with the one reported by Sigmund H. Ein[11] but confirms that children with intussusception hardly have lead-points.

The prevalence of worm infestation is 78% in our population as compared to 70% in rest of India.[3] Other complications from ascariasis like biliary ascariasis in this part of the country account for 10% of cases.[12] Obstruction due to Ascariasis commonly occurs at the terminal ileum, although large numbers of worms are found in the jejunum. Delay in the management of the intestinal obstruction can lead to bowel perforation with escape of the worms and eggs into the peritoneal cavity.[5] Delay most often occurs because of late arrival or referral to the hospital and lack of awareness. Patients who present early with a low grade or no fever, slight abdominal distension, and mild diffuse tenderness can be managed conservatively. If patients present late, most of them will look seriously ill and dehydrated, and usually they have a high fever with peritonitis in which case urgent laparotomy is indicated.[9,13] Plain abdominal radiograph reveals several loops of moderately distended small bowel loops, evidence of multiple air-fluid levels, and shadows of round worms. Ultrasound confirms the diagnosis by the presence of the typical signs of ascariasis (bull's eyes in transverse section and railway appearance in longitudinal sections).[14] In suspected cases of bowel perforation, X-ray abdomen CT scan detects free intraperitoneal air.

We adopt the conservative management for 24 h in our patient, who had partial intestinal obstruction with no intraperitoneal free air. The conservative management includes adequate fluid and electrolyte replacement to overcome the dehydration, nasogastric aspiration for decompression and to relieve distension or vomiting, and antibiotic coverage with analgesics. No antihelminthic was given at this stage, as it may worsen the obstruction by increasing the size of the bolus of the worm. Hypertonic saline enema has been recommended by some authors.[15]

Most of the patients do respond to the conservative management. In such patients, antihelminthic drug should be given in the hospital after obstruction has subsided. If it is successful with no more obstruction, the patient can be safely discharged home. The dose of antihelminthic drug has to be repeated 6 weeks later to eradicate any worms that might have been in the larva phase at the time of admission.[14]

The type of surgery depends on the findings at laprotomy. If the bowel is viable and the obstruction is at the level of the ileum, milking of the worms to the caecum can be attempted carefully without causing trauma to the bowel wall.[16] If this is not possible or the obstruction is at the level of the jejunum, enterotomy should be carried out through a longitudinal incision with removal of the worms by sponge-holding forceps. The incision should be closed transversally with great care to avoid contamination of the peritoneal cavity by the worms or its eggs. Multiple enterotomies may be required in case of multiple masses, which cannot be milked successfully.

Where the intestinal wall is thin and too tightly packed with worms, milking should not be attempted because it may result in serosal tears. Although some surgeons favour fragmentation of worms before milking, we strongly advocate against it as this may release toxins and cause toxemia. In cases presenting with bowel gangrene, perforation, or intussusception with compromised bowel, resection with primary anastomosis may be needed. We have seen few cases with anastomotic leak with worms coming out from anastomotic site. This is due to the wanderlust of these worms and tendency to explore orifices.[17]

In conclusion, intestinal obstruction is a major source of morbidity and mortality. Intestinal ascariasis is the commonest cause of intestinal obstruction in our setting and should be kept as first differential diagnosis in childhood intestinal obstruction. Proper attention to hygiene and sanitation and regular deworming should be done in children in schools to minimize ascariasis and its complications, which have constituted a major public health problem.

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EVENTS: MEETINGS AND COURSES

To submit a meeting notice send the following to afranu@yahoo.com: name of meeting group; dates of meeting; place of meeting; telephone and name of person to be called for full information. The Journal reserves the right to decline notices at discretion of editorial office.

1. MEETINGS

August 2010: Ilorin, Nigeria. You are invited to the **9th Annual General Meeting and Scientific Conference** of our great association, Association of Paediatric Surgeons of Nigeria (APSON), tagged **APSON ILORIN 2010.** This year's event is coming up in **Ilorin the Kwara state capital, Nigeria, from 13th-18th of September, 2010.** The theme of the conference is Minimal Access Paediatric Surgery and the subtheme is Management of Anorectal Malformation. There will be **a 2 day pre-conference workshop on 14th and 15th of September 2010** during which practical sessions and live surgery would be carried out using the minimal access techniques (laparoscopy and endoscopy) to be demonstrated by international and local faculties. This promises to be very exciting and interesting. Lots of other programs are also scheduled to make your attendance very rewarding.

Eminent Scholars, clinicians, governmental and non-governmental policy makers and guests from abroad are expected to participate in the preconference and main conference.

Kwara state is the **"state of Harmony"** and Ilorin is peaceful with its "clean and Green" program which provides a conducive and fascinating environment for this type of conference. Ilorin is the gateway between the North and southern parts of the country and could be accessed through the Ilorin International Airport and many road networks.

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   E-mail address: walo1ng@yahoo.co.uk

OR

2. Prof. O. Adejuyigbe. President, APSON.
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July 5-10, 2010: Dar-es-Salaam, Tanzaniza. 8th Biennual Conference of Pan Africa Paediatric Surgeons Association (PAPSA). This conference affords you a rare opportunity to meet and interact with Paediatric surgeons, not only from all parts of Africa, but from all over the world. It is a must attend-attend meeting!

For further information, please contact:

1. Dr. Petronilla J. Ngiloi. Vice President of PAPSA & Chairman, local organizing committee.
   E-mail address: pngiloi@much.ac.tz OR
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2. Prof. Essam A. Elhalaby. Secretary, PAPSA.
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October 21-24, 2010: 3rd World Congress of Pediatric Surgery, Hotel Taj Palace and Convention Centre, New Delhi, India. There will be a Post Conference Live Operative Workshop at AIIMS, New, from 25th-26th, 2010.

Further information: Prof. Devendra K Gupta, Congress President, Cell: +91 98100 65280, 98683 97500
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