

## Original Research Article

# A clinical study of gastrointestinal obstruction among children in a tertiary referral centre of North India

J. K. Singh, Mayank Singh\*

Department of Surgery, MLN Medical College, Prayagraj, U.P., India

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**\*Correspondence:**

Dr. Mayank Singh,

E-mail: [dr.mayanksingh78@gmail.com](mailto:dr.mayanksingh78@gmail.com)

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### ABSTRACT

**Background:** Children are a unique lot in that, since, in contrast to adults, in which post op adhesive obstruction and inflammatory causes predominate, in children congenital causes also make a significant part.

**Methods:** This study was a retrospective analysis of the clinico pathological data of patients (between 1 month and 12 years of age) who presented to the department of surgery, MLNMC, Prayagraj with clinical diagnosis of intestinal obstruction. The study included patients who were admitted to the department between April 2013 and April 2019.

**Results:** A total of 130 patients were admitted in pediatric unit of general surgery department during the study period. Of these 83 were males and 47 were females. In the end, 116 fulfilled the inclusion or exclusion criteria. 21 patients were successfully managed conservatively. 95 were operated.

**Conclusions:** Intussusception is the most common cause. Koch's abdomen is the most common cause in children >5years with a vast majority being females. Majority of the patients whose clinical diagnosis is Koch's abdomen, post-operative adhesive obstruction or worm infestation can be conservatively managed. Obstructed inguinal hernia still remains a potential preventable cause of intestinal obstruction.

**Keywords:** Intestinal obstruction children, Intussusception, Malrotation, Hirschsprung's disease, Meckel's diverticulum, Koch's abdomen children

### INTRODUCTION

Intestinal obstruction occurs whenever there is impedance of flow of contents through the lumen of the bowel.<sup>1</sup> The cause can be within the lumen e.g., worms, fecalith; within the wall e.g., strictures, neoplasms; or from outside e.g., adhesions, bands. The pathology can be congenital, inflammatory, and neoplastic. In contrast to adults in which post op adhesive obstruction, inflammatory and neoplastic causes predominate, in children, congenital causes predominate.<sup>2,3</sup>

Due to the above differences vis a vis adults and also since the presentation in children can be difficult to diagnose because adequate history may not be always

present and clinical signs may be subtle and overlapping with other surgical and non-surgical diseases, a need was felt for a study to better appreciate the clinical features of intestinal obstruction in children.

#### Objectives

The objectives of the present study was to identify the clinico-pathological features of individual causes of intestinal obstruction; to identify the most common pathologies in different age groups and thus to be better able to predict and prepare beforehand for perioperative challenges and complications; also to identify pathologies, which have high chances of being conservatively managed and to collect data, which may

help to sensitize the primary care physician with regard to early identification and referral to a specialist surgical centre.

## METHODS

This study was a retrospective analysis of the clinico pathological data of patients (between 1 month and 12 years of age) who presented to the department of surgery, MLNMC Prayagraj with clinical diagnosis of intestinal obstruction. The study included patients who were admitted to the department between April 2013 and April 2019.

### Inclusion criteria

Patients between 1 month and 12 years of age with clinical diagnosis of intestinal obstruction were admitted between April 2013 and April 2019 in Department of Surgery.

### Exclusion criteria

Exclusion criteria were patients in whom a definitive diagnosis of cause of obstruction was not reached with investigation or operative findings; a patient who died or underwent LAMA or absconded before a diagnosis of cause of intestinal obstruction was reached.

Every patient was appropriately investigated which included hemograms, blood biochemistry, skiagrams of abdomen, USG and CT scan abdomen as indicated by the clinical scenario. If clinical picture permitted, every patient underwent a trial of conservative management which included but was not limited to NPO with RT aspiration, IV fluids and antibiotics. Meanwhile every effort was made to reach a diagnosis of the cause of intestinal obstruction. Those who failed conservative management were operated and intra op findings and procedure done were meticulously recorded. Post op clinical data was also reviewed and any significant complications were noted. Patients were followed up as deemed necessary and any prominent complications recorded and addressed.

Since the study was observational in nature and no comparison with a control arm was used, basic statistical methods were only used viz., tabulation of data, calculation of arithmetic means, ratios and percentages.

## RESULTS

A total of 130 patients were admitted in pediatric unit of General Surgery department during the study period. Of these 83 were males and 47 were females. Among these, 11 patients left against medical advice before they were operated so these were excluded from the study. Also there were 3 expiries during initial management-these were also excluded from the study.

**Table 1: Age distribution of different diagnosis (n=116).**

Diagnosis	1 month-1 year	1 year-5 years	5 years
Intussusception	16	5	0
Malrotation	6	6	2
Meckel's with band	2	5	5
Hirschsprung's disease	12	5	0
Postop adhesive obstruction	3	6	2
Koch abdomen	0	5	8
Miscellaneous	14	10	4
SUM	53 (M- 38, F- 15)	42 (M- 28, F- 14)	21 (M- 8, F- 13)

M- male; F- female.

**Table 2: Distribution of patients with respect to diagnosis (n=116).**

Diagnosis	No. of patients	Male	Female
Intussusception	21	15	6
Malrotation	14	11	3
Meckel's with band	12	8	4
Hirschsprung's disease	17	11	6
Postoperative adhesive obstruction	11	6	5
Koch abdomen	13	3	10
Miscellaneous	28	20	8
SUM	116	74	42

Bilious vomiting, abdominal pain, constipation, abdominal distension and abdominal tenderness were the

predominant presenting clinical features in decreasing order of frequency.

**Table 3: Miscellaneous cases distribution (n=28).**

Diagnosis	Gender	No. of patients
Obstructed inguinal hernia	Male	5
	Female	1
Congenital band	Male	2
	Female	1
Post-operative V-P shunt	Male	3
	Female	1
Worm obstruction	Male	2
	Female	2
Post op Intussusception	Male	2
	Female	1
Post NEC colonic stricture	Male	3
	Female	0
Duodenal or jejunal web	Male	2
	Female	2
Eventration of diaphragm with gastric volvulus	Male	1
	Female	0

**Table 4: Management- conservative vs. operative.**

Diagnosis	No. of patients	Conservative management successful	Failed conservative management or operated
Intussusception	21	0	21 ( M- 15, F- 6)
Malrotation	14	0	14 ( M- 11, F- 3)
Meckel's with band	12	0	12 ( M- 8, F- 4)
Hirschsprung's disease	17	0	17 ( M- 11, F- 6)
Postop adhesive obstruction	11	6	5 ( M- 3, F- 2)
Koch abdomen	13	10	3 ( M- 1, F- 2)
Miscellaneous	28	5	23 ( M- 19, F- 4)
SUM	116	21	95

M- male; F- female.

**Table 5: Complications in perioperative period.**

Post op complications	No. of patients
Surgical site infection	6
Respiratory complications	6
Recurrent intestinal obstruction	4
Expiry	13 (intussusception- 5, malrotation- 2, Hirschsprung's disease- 3, miscellaneous- 3)

Most common cause, overall, was intussusception. Intussusception was also the main cause in age 1 month-1 year, while malrotation and postoperative adhesive obstruction were the commonest cause in age group 1 year-5 years. Koch's abdomen was the most common diagnosis among children with age >5 years (Table 2).

21 patients responded to conservative management (Koch's abdomen- 10, post-op adhesive obstruction- 6, miscellaneous- 5).

95 patients were operated. Majority of the patients whose clinical diagnosis was Koch's abdomen, post-operative adhesive obstruction or worm obstruction responded to conservative management although 3 patients of Koch's

abdomen were readmitted with clinical features of obstruction (Table 4).

Complications were observed in 26 patients. Most common complications were SSI and RTI (Table 5).

## DISCUSSION

Intestinal obstruction is a common cause of surgical emergency in paediatric as well as adult population. The cause of intestinal obstruction in paediatric age group varies from country to country and geographical variation exists also.<sup>3-8</sup>

In neonates majority of gastrointestinal (GI) obstruction are due to congenital lesions such as anorectal

malformations, Hirschsprung's disease, GI atresia, malrotation; however, in infants and children, GI obstruction is due to a variety of congenital (e.g., Hirschsprung's disease, malrotation) as well as acquired causes such as intussusception, post-operative adhesive obstruction, Koch's abdomen, worm obstruction etc.<sup>2,4,5</sup>

In our series, which included patients between 1 month and 12 years of age, GI obstruction was most commonly due to intussusception (18%), Hirschsprung's disease (14%), malrotation (12%), Koch's abdomen (11%), Meckel's diverticulum (10%) and post-operative adhesive obstruction (9.5%).

In majority of the patients with intussusception (75%), the presentation was between 1 month and 1 year of age. Similarly, majority of the patients of malrotation (85%) and Hirschsprung's disease (100%) presented before 5 years of age. The presentation of obstruction was late, i.e., after 1 year of age, when the cause was post-operative adhesive obstruction (72%), Meckel's diverticulum (83%) and Koch's abdomen (100%).

With respect to age distribution, intussusceptions was most common (30%) in 1 month to 1 year age group. In age group, 1 year to 5 years, malrotation was most common (42%) and beyond 5 years of age, Koch's abdomen was most common (38%). Among the miscellaneous causes, obstructed inguinal hernia was most common (21%) and the majority of these were males (83%).

With respect to sex distribution, majority of the GI obstruction occurred in males (64%). Among the males, miscellaneous group (27%) and intussusception (20%) made up the dominant causes. Among females, Koch abdomen (24%) and miscellaneous (19%) causes were dominant. The predominance of Koch abdomen in females (24%) as compared to males (4%) is striking; this might point out a greater incidence of tuberculosis as well as presence of neglected disease among females in our society where male child is still favoured over female.

In other studies also, intussusception is the most common cause of obstruction in infants with few exceptions. The reason, for this, may be that these later studies included both neonates as well as children with neonates comprising more than 50% of the total subjects.<sup>3-10</sup>

Nowadays, majority of the idiopathic intussusception can be reduced with radiological guidance (where facilities are available). In our setup, such facilities are not available in emergency situations so all the patients were ultimately operated. The rate of bowel resection in complicated cases varies from 10% to 80% however it was 28% in our series.<sup>4,11</sup> We have observed that in children <6 months of age with intussusceptions, 80% required resection; similar increased rate was also seen in other series.<sup>8</sup> The mortality rates for children with intussusception ranges from 0%<sup>8</sup> to 25%<sup>12</sup>; in our series this mortality is 29%.

Malrotation of gut, being a congenital anomaly, can present at any age. In our series, malrotation with volvulus causing intractable bilious vomiting presented very early, that is, one to two months of age; however, others presented late, that is, around 3 to 5 years of age. These, that presented late, had a history of at least three to five prior admissions of GI obstruction which got resolved on conservative treatment. This is expected as GI obstruction in malrotation can be waxing and waning and hence requires high degree of suspicion for making a diagnosis. Lack of significant abdominal distension in spite of intestinal obstruction further adds confusion to the diagnosis.

Hirschsprung's disease presentation beyond neonatal period is common in developing countries.<sup>8,13</sup> In our series 58% presented less than 6 months of age and 35% presented at more than 12 months of age which is similar in comparison to Gangopadhyay et al.<sup>8</sup> However, mean age at diagnosis has improved over last 30 years. A trend is clearly visible-patients presenting with features of acute intestinal obstruction, not responding to conservative treatment, are diagnosed early due to early referral to our centre; however, patients presenting with constipation without significant obstructive features are diagnosed late. As shown by Badner et al, males predominated in our series also (65%).<sup>14</sup> At our centre we perform two stage procedure-leveling colostomy followed by definite pull through procedure because of lack of frozen section facilities.

Most Meckel's diverticula are asymptomatic. Children with symptoms most commonly present with bowel obstruction (40%) mainly due to distal ileal obstruction secondary to bowel torsion around an omphalomesenteric band.<sup>15</sup> Minority present with intussusception.<sup>3</sup> In our series 12 presented with volvulus and only one presented with intussusception. Majority presented beyond one year of age (83%) though some series show incidence to decrease with age in pediatric population.<sup>15</sup> Most were males (67%) as in other series.<sup>15</sup>

Patient with Koch's abdomen contributed 11% of the total in our series which is same as Gangopadhyay et al.<sup>8</sup> In our series 38% were diagnosed less than 5 years of age in comparison to 100% diagnosed in more than 5 years of age in his series. Majority (77%) of patients with Koch's abdomen responded to conservative treatment in our series. As noted earlier, a significant majority (77%) were females.

Six children (5% of total obstruction cases) of irreducible inguinal hernia were identified in our series. They presented at a mean age of 31 months. All had an obstructed small bowel within the hernia sac.

Post-operative adhesive intestinal obstruction represented 9.5% (11 patients) in our series which is similar to a study of Ghana while these these figures are quite low when we see other studies like those of Christop et al.<sup>4,10</sup> In both the above studies, majority of the patients

required surgical exploration while we have seen in our study that majority (54%) could be conservatively managed.

Worm obstruction has very low incidence now a days because of routine deworming programs of government (3% in our series). Other uncommon causes of obstruction like post necrotizing enterocolitis colonic stricture (3%), jejunal webs (3%), post-operative intussusceptions (3%) etc., should also be kept in mind while dealing with children presenting with features of GI obstruction.

Most common complications were SSI and respiratory tract infections (5% each) with lower respiratory tract infection contributing to mortality in 3 patients. During the study period 4 patients presented with recurrent obstruction (3%), among these were 3 conservatively managed Koch's abdomen and 1 with post-operative adhesive obstruction.

Mortality in our series is 11.2% (13 patients) which is nearly same as in other series but is higher than in others.<sup>3,4,6</sup> Most of the patients (8) died within 24 hours after surgery due to very low GC at the time of surgery.

## CONCLUSION

Overall, intussusception is the most common cause. Malrotation and post-operative adhesive obstruction were the obstruction are the commonest cause in age group 1 year-5 years. Koch abdomen is most common cause in children >5 years with a vast majority being females. Majority of the patients whose clinical diagnosis was Koch's abdomen, post-operative adhesive obstruction and worm obstruction can be conservatively managed. Also noted is a lack of sufficient awareness among primary care physicians regarding malrotation and Hirschsprungs disease as a cause of acute abdomen in children. There is also a need to sensitise public for early surgical treatment of potential preventable causes of obstruction like congenital inguinal hernias. Most common complications are SSI and RTI.

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