



A PROSPECTIVE STUDY TO DETERMINE CAUSE AND OUTCOME OF INTESTINAL OBSTRUCTION IN NON-NEONATAL CHILDREN

Pharmacology

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ABSTRACT

Background: Intestinal obstruction is one of the commonest surgical emergencies encountered in pediatric patients. Intestinal obstruction in children differs from that in adults in many context. The aim of the study was to find out incidence, etiologies, clinical features, outcome and mortality of paediatric age groups with intestinal obstruction.

Methods: This is a prospective study of 200 cases of paediatric age group with signs and symptoms of intestinal obstruction which were admitted in GMC, Kannauj, India during period between Nov 2017 to Oct 2019. Surgical intervention was carried out as and when indicated. Data was analysed in SPSS version 20 for percentage and frequencies.

Results: Out of 200 patients in the study, 142 (71%) were Male whereas 58(29%) Patients were female. Majority of them were in the Age group of 1 month to 1 year (38%). Most common clinical features for intestinal obstruction was Abdominal distension 98 (49%). Most common cause for intestinal obstruction was Adhesions and Bands 40(20%). Postoperative complications were Nil in significant proportion of patients but some cases were observed with postoperative complication like Wound infection 19 (9%). 14(7%) mortality was observed out of which 3(1.5%) patients expired in the age group of 1 month to 1 year. 78 (39%) patients reported between 48 to 72 hrs after the onset of symptoms.

Conclusions: Non neonatal intestinal obstruction is affected by many risk factors as: age, gender, birth weight, maturity and time of presentation. Proper diagnosis and timely surgical intervention can save many children's lives. General surgeon with skill in performing colostomy, resection anastomosis can handle most of the cases even in absence of pediatric surgeons.

KEYWORDS

Pediatric, Intestinal obstruction, Intussusception, Intestinal atresia, Non-neonate

INTRODUCTION

Intestinal obstruction is one of the commonest surgical emergencies encountered in pediatric patients. Paediatric surgery is a fast expanding branch and in spite of great strides it had made in last 4 decades, mortality and morbidity in children with intestinal obstruction remains apparently high. In last decades, great advances have been made in pre-and postoperative intensive care and anaesthesia and therefore scenario of diagnosis and management of pediatric intestinal obstruction has been changed due to better understanding of pathophysiology, improvement in diagnostic methods, availability of better antibiotics.¹

The pathophysiology of intestinal obstruction in children is almost similar to that of the adults, except the fact that in paediatric patients congenital causes of intestinal obstruction play an additional role. Besides, during resuscitation of paediatric patients, exact estimation of fluid and electrolyte requirement plays a major role in the management. Various causes of intestinal obstruction in paediatric age group have been described. These causes vary from country to country and region to region.²⁻⁵

Belokar et al⁶ has mentioned some common causes as intussusception, infantile hypertrophic pyloric stenosis, Hirschsprung's disease, imperforate anus, meconium ileus, malrotation and volvulus, intestinal atresia, annular pancreas etc. Majority of the paediatric patients with intestinal obstruction present with common symptoms of Vomiting, abdominal pain and non passage of stool (constipation) or passage of blood mixed mucus. Children in general have poor tolerance for dehydration and electrolyte imbalance that are caused by intestinal obstruction. Non passage of stool in large bowel obstruction distends the gut. Enterocolitis may ensue causing perforation and peritonitis. The ischemic or gangrenous gut in strangulated hernia or volvulus leads to septicemia. Thus an acute intestinal obstruction in children is a life threatening emergency. It is important for the pediatrician or the emergency medical officer to diagnose it early and refer to the surgeons.

Majority of the paediatric patients with intestinal obstruction present with common symptoms of abdominal distension, constipation or failure to pass meconium, vomiting, fluid and electrolyte imbalance etc. Majority of birth defects present in neonatal age group, but infantile hypertrophic pyloric stenosis commonly occurs around the age of 3 weeks. Intussusception is commonly seen in healthy children

of 6-11 months of age. The character of vomitus also plays an important role in making the diagnosis. Bilious vomiting soon after the birth goes in favor of intestinal atresia. In majority of cases of duodenal atresia, vomiting is bilious as the obstruction is beyond the opening of ampulla of Vater in second part of the duodenum. In infantile pyloric stenosis, vomiting is non-bilious and projectile. Severe vomiting in patients of intestinal obstruction can lead to dehydration, electrolyte imbalance and aspiration pneumonia in paediatric patients. In cases of duodenal atresia, abdominal distension is absent or negligible. In contrast, it is a prominent feature in cases of jejunal and ileal atresia, Hirschsprung's disease etc.

In severe cases, it can cause tenting of diaphragm, which can lead to difficulty in breathing. In majority of the cases, X-ray abdomen in erect position demonstrates dilated bowel loops with multiple air fluid levels.⁷ Ultrasonography plays an important role in diagnosis of intestinal obstruction due to some cause like infantile hypertrophic pyloric stenosis, Intussusception etc.⁸ Besides, antenatal ultrasonography can diagnose some congenital causes of intestinal obstruction like duodenal atresia etc.⁹ Hirschsprung's disease is commonly diagnosed by barium enema and rectal biopsy. Early diagnosis and treatment is essential in intestinal obstruction in pediatric patients, otherwise it may lead to fluid and electrolyte imbalance, perforation peritonitis, aspiration pneumonia etc and may increase mortality and morbidity. Looking into the impact of the disease the study was planned out to study of cause and outcome of intestinal obstruction in non-neonatal children.

AIM AND OBJECTIVES

1. To assess the incidence of various causes of intestinal obstruction in pediatric age group.
2. To find out the overall status of diagnosis and management of intestinal obstruction in pediatric age group.
3. To evaluate the ultimate outcome in terms of morbidity and mortality in intestinal obstruction of pediatric age group.

MATERIAL AND METHODS

The present prospective study was conducted in department of Surgery, Government Medical College, Kannauj (U.P) in paediatric patients admitted with clinical features and diagnosis of intestinal obstruction between Nov 2017 to Oct 2019 (2 years). Paediatric patients from age group of 28 days to 15 years of age were included in this study. Each patient was reviewed in terms of age, sex, symptoms,

diagnosis, treatment and final outcome. A convenient sampling method was used where all cases admitted to the department were recruited as per inclusion criteria. Parental consents were taken as per proforma.

• INCLUSION CRITERIA

1. Children below 15 years of age, with intestinal obstruction, diagnosed by physical examination including Digital Rectal Examination (DRE) and validated by investigation like plain x-ray abdomen, USG, CT scan and Barium/ Gastrografin contrast study.
2. Patients/Legally accepted representative (LAG) willing to give consent form.

• EXCLUSION CRITERIA

1. Cases of intestinal obstructions due to non surgical causes like septicemia, head injury (birth trauma), hypothyroidism, and post diarrheal ileus.
2. Patients with other major congenital anomalies.
3. Patients/Legally accepted representative (LAG) willing to give consent form.

• Clinical Presentation

Pain abdomen is present in all the cases of intussusceptions with vomiting, constipation (or bloody mucus discharge per rectum) and a palpable abdominal lump sometimes. Vomiting, pain abdomen, constipation and distension were present in obstructed hernias and Meckel's diverticulum. Meckel's diverticulum could only be diagnosed after laparotomy. Diagnosis of Ladd's band with malrotation of mid gut could only be made with the aid of USG, CT scan and Gastrografin study.

A case of annular pancreas presents persistent bilious vomiting. Abdominal radiograph shows double bubble sign. A case of meconium ileus in new born presents with distended abdomen, fails to pass meconium and DRE realized very sticky meconium. Plain x-ray abdomen has ground glass appearance. Gastrografin eases the sticky meconium out which is the standard practice being followed in uncomplicated cases.

• Study Procedures

General measures: Resuscitation with IV fluid, naso/orogastric intubation, IV antibiotic were instituted in all the cases. Investigations like ultrasonography, barium study, CT scan or MRI of abdomen were performed as per requirement of specific patients. Gangrenous appendicitis that was diagnosed on clinical and radiological examination as intestinal obstruction was also included in the study. All clinical and epidemiological data were collected on a designed proforma. All the patients were managed according to standard protocols. Complete blood count, serum electrolyte and urea level were done. Patients were initially resuscitated and once stabilized then categorized in to those who needed surgical intervention and those who can safely be treated conservatively.

Surgical procedure was performed according to the pathology and condition of the patients assessed by the operating surgeon. Some postoperative patients were managed in intensive care unit while stable patients were managed in ward.

Operative measures:

All cases were operated under endotracheal general anesthesia. A transverse right upper quadrant supraumbilical incision was made for laparotomy. To add to safety, the abdominal wall can be lifted at the time of incision by the assistant between thumb and forefinger of both hands. Intussusceptions were reduced whenever possible and appendectomy and ileo-cecocolostomy done. Resection anastomosis was done in all the cases of strangulated hernias, in all cases of Meckel's diverticulum, and in cases of intussusceptions where the gut was gangrenous and in cases the lead point were Meckel's diverticulum. Gut anastomosis was performed by one layer interrupted suture technique. Colostomy was done for imperforate anus and Hirschsprung's disease. Ladd's procedure was performed for the malrotation of gut (untwisting of the twisted gut, excision of the band and appendectomy). Duodenoduodenostomy was done for annular pancreas and adhesiolysis for intraperitoneal adhesion.

STATISTICAL ANALYSIS:

All patients were followed up on regular basis after discharge from the

hospital. Data were entered into SPSS software version 20 for percentage and frequencies. Descriptive analysis of data was done at first; then cross tabulation of variables with chi-square tests was done. P-value <0.05 was used to indicate significant value.

RESULTS

Following result was obtained during the study period.

- During the study Period, out of 200 Patients with intestinal obstruction it was observed that 142 (71%) were Male whereas 58(29%) Patients were female. Similarly it was observed that at majority of Patients were in the Age group of 1 month to 1 year (38%) followed by Age group of 6 to 15 year (20%) while Patients with age group of 4 to 5 year was minimum (6%). In our study at government hospital χ^2 was 3.22, d.f was 2 and p value was 0.377, which indicates that there was no association between age group and gender as depicted in table no 1.

Table 1: Gender wise Age group distribution of pediatric patients with obstruction (n=200)

AGE	GENDER		No. of Patients (%)
	Male (n=142)	Female (n=58)	
1 month to 1 year	56	20	76 (38)
1 to 2 year	18	4	22 (11)
2 to 3 year	12	2	14 (7)
3 to 4 year	18	8	26 (13)
4 to 5 year	8	4	12 (6)
5 to 6 year	8	2	10 (5)
6 to 15 year	22	18	40 (20)
Total	142 (71%)	58 (29%)	200 (100)
χ^2 3.22 d.f=2 p=0.377			

- The study reports revealed that most common clinical features for intestinal obstruction was Abdominal distension accounting for 98(49%) cases followed by Abdominal Pain 82(41%), Vomiting 59(29.5%) while least common clinical features was Peritonitis & Shock & Excessive Crying accounting for 12(6%) & 17 (8.5%) respectively as depicted in table no 2.

Table 2: Distribution of patients according to various clinical features

Clinical Features	GENDER		No. of Patients (%)
	Male (%) (n=142)	Female (%) (n=58)	
Abdominal Distension	77 (54.22)	21 (36.20)	98 (49)
Not Passing stool/Muconium	28 (19.71)	13 (22.41)	41 (20.5)
Excessive Crying	10 (7.04)	07 (12.06)	17 (8.5)
Abdominal Pain	55 (38.73)	27 (46.55)	82 (41)
Visible Peristalsis	06 (4.22)	02 (3.44)	08 (4)
Vomiting	45 (31.69)	14 (18.96)	59 (29.5)
Constipation	29 (20.42)	11 (18.96)	40 (20)
Peritonitis & Shock	08 (5.63)	04 (6.89)	12 (6)
Total	258	99	357

- On analyzing patients according to various causes for obstruction, it was observed that most common cause for intestinal obstruction was Adhesions and Bands accounting for 40(20%) followed by Intussusception 34 (17%), Malrotation 29 (14.5%) while least causes were Worm Obstruction 2(1%) & Multiple Small Bowel strictures 3 (1.5%) as represented in table no 3.

Table 3: Distributions of patients according to various causes

CAUSES OF OBSTRUCTION	GENDER		No. of Patients (%)
	Male (%) (n=142)	Female (%) (n=58)	
Adhesions and Bands	27 (19.01)	13 (22.41)	40 (20)
Intussusception	25 (17.60)	09 (15.51)	34 (17)
Malrotation	22 (15.49)	07 (12.06)	29 (14.5)
Meckel's diverticulum	17 (11.97)	04 (6.89)	21 (10.5)
Obstructed Hernia	12 (8.45)	07 (12.06)	19 (9.5)
Hirschsprung's diseases	07 (4.92)	03 (5.17)	10 (5)
Abdominal tuberculosis	06 (4.22)	02 (3.44)	08 (4)
Gangrenous appendicitis	03 (2.11)	03 (5.17)	06 (3)
Segmental enteritis	03 (2.11)	02 (3.44)	05 (2.5)

Mesenteric cysts	03 (2.11)	01 (1.72)	04 (2)
Multiple Small Bowel strictures	02 (1.40)	01 (1.72)	03 (1.5)
Worm Obstruction	01 (0.70)	01 (1.72)	02 (1)
Others	13 (9.15)	06 (10.34)	19 (9.5)
Total	142 (100)	58 (100)	200 (100)

- In our study, postoperative complications were Nil in significant proportion of patients. However some cases were observed with postoperative complication like Wound infection accounting for 19 (9%) cases followed by Excoriation of skin 11(5.5%) cases while Secondary Suturing 2 (1%) & Retraction of colostomy 4 (2%) were least observed postoperative complications as shown in table no 4.

Table 4: Distributions of patients according to various postoperative complications

CAUSES OF OBSTRUCTION	GENDER		No. of Patients (%) (n=200)	
	Male (%) (n=142)	Female (%) (n=58)		
NIL	108 (54)	40 (22.41)	148 (74)	x ₂
Wound infection	13 (6.5)	06	19 (9)	9.39
Excoriation of skin	07 (4.92)	04 (15.51)	11 (5.5)	p=0.047 2*
Septicaemia	06 (4.22)	03 (12.06)	09 (4)	
Retraction of colostomy	02 (1.40)	02 (6.89)	04 (2)	
Secondary Suturing	02 (1.40)	00 (1.72)	02 (1)	
Others	04 (2.81)	03 (1.72)	07 (3.5)	
Total (n=200)	142 (100)	58 (100)	200 (100)	

- On analyzing mortality rate related age it was observed that 14(7%) mortality was observed out of which 3(1.5%) patients expired in the age group of 1 month to 1 year, 2(1%) patients expired in the age group of 3 to 4 year and 4 to 5 year while least mortality were observed in the age group of 1 to 2 year, 2 to 3 year & 5 to 6 year i.e 1(0.5%) as represented in table no 5.

Table 5: Mortality rate related age

AGE	GENDER WISE MORTALITY		No. of case	Mortality (%)	Cause of obstruction
	Male (n=142)	Female (n=58)			
1 month to 1 year	02	01	76	03 (1.5)	Adhesions and Bands
1 to 2 year	00	00	22	01 (0.5)	
2 to 3 year	00	00	14	01 (0.5)	
3 to 4 year	2	00	26	02 (1)	Intussusception
4 to 5 year	01	01	12	02 (1)	Adhesions and Bands & Malrotation
5 to 6 year	00	01	10	01 (0.5)	Mesenteric cysts
6 to 15 year	03	01	40	04 (2)	Malrotation & Abdominal tuberculosis
Total	08 (4%)	04 (2%)	200 (100)	14 (7%)	
x ₂ 6.09 d.f=4 p=0.957					

- Our study results revealed 78 (39%) patients reported between 48 to 72 hrs after the onset of symptoms, 59 (29.5%) reported between 24 to 48 hrs, 42(21%) between 0 to 24 hrs while only 21(10.5%) patients reported after 72 hours of the onset of symptoms as represented in table no 5.

Table 6: Time of presentation after the onset of symptoms

Time of Presentation	No. of Patients (n=200)	Percentage (%)
00 to 24 hrs	42	21
24 to 48 hrs	59	29.5
48 to 72 hrs	78	39
> 72hrs	21	10.5

DISCUSSION

Intestinal obstruction is a common pediatric surgical problem. It cuts across different age groups in children. Its occurrence in children may

be acute or chronic.^{10,11} In our study out of 200 Patients it was observed that 142 (71%) were Male whereas 58 (29%) Patients were female. Similarly it was observed that majority of Patients were in the Age group of 1 month to 1 year (38%) followed by Age group of 6 to 15 year (20%) while Patients with age group of 4 to 5 year was minimum (6%) which was in accordance with the study done by L. Dasaradha Rao et al.¹²

Our study results reported that most common clinical features for intestinal obstruction was Abdominal distension 98 (49%) followed by Abdominal Pain 82 (41%) while least common clinical features was Peritonitis & Shock which was in accordance with the study done by Bhedi et al.¹³ Our findings were also similar to the findings of park CH et al.¹⁴

Our study results showed that that most common cause for intestinal obstruction was Adhesions and Bands accounting for 40(20%) followed by Intussusception 34 (17%), Malrotation 29 (14.5%) which was almost similar to Hussain I et al¹⁵ & Banu T et al¹⁶ findings while least causes were Worm Obstruction 2(1%) & Multiple Small Bowel strictures 3 (1.5%) which was similar to the findings of Pathak et al.¹⁷

In our study we found that were Nil in significant proportion of patients i.e 74% which was similar to the findings of Gangopadhyay et al¹⁸ while it was contradictory to the findings of Park CH & Adeyemi D et al^{14, 19} who reported more percentage of patients postoperative complications with postoperative complications. However some cases were observed with postoperative complication like Wound infection 19 (9%) followed by Excoriation of skin 11(5.5%) while Secondary Suturing 2 (1%) & Retraction of colostomy 4 (2%) were least observed postoperative complications which was in accordance with the study done by Bhedi et al.¹³

In our study it was observed that 14 (7%) mortality was observed out of which 3 (1.5%) patients expired in the age group of 1 month to 1 year, 2 (1%) patients expired in the age group of 3 to 4 year and 4 to 5 year while least mortality were observed in the age group of 1 to 2 year, 2 to 3 year & 5 to 6 year i.e 1 (0.5%) which was slightly higher than the findings of L. Dasaradha Rao et al & Bhedi et al^{12,13} who reported 12% mortality rate. The most possible reason for increased percentage of mortality in our study could be due to more sample size in our study in comparison than the earlier studies. Our study results revealed 78 (39%) patients reported between 48 to 72 hrs after the onset of symptoms, 59 (29.5%) reported between 24 to 48 hrs, 42(21%) between 0 to 24 hrs while only 21(10.5%) patients reported after 72 hours of the onset of symptoms which was contradictory to the findings of L. Dasaradha Rao et al¹² who reported that majority of patients reported between 48 to 72 hours in their study.

CONCLUSION

While the causes of intestinal obstruction are diverse, a systematic approach can be used to differentiate the most common causes. The history, initial presentation, physical examination, and plain radiographs frequently can establish the diagnosis. The choice of additional Diagnostic imaging such as an upper or lower gastrointestinal series or ultrasound, should be based on the results of the initial workup.

Non neonatal intestinal obstruction is affected by many risk factors as: age, gender, birth weight, maturity and time of presentation. Early resuscitation and rehydration of patient in emergency room affects the outcome of further management. Management of obstruction requires a high degree of suspicion, careful assessment, and awareness while the appropriate treatment needs to be tailored to the individual situation. Proper diagnosis and timely surgical intervention can save many children's lives. General surgeon with skill in performing colostomy, resection anastomosis can handle most of the cases even in absence of pediatric surgeons.

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