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## RESEARCH ARTICLE

# INTESTINAL OBSTRUCTION IN NEONATAL AND PEDIATRIC AGE GROUP (A CLINICO-PATHOLOGICAL STUDY)

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### ABSTRACT

Intestinal obstruction is one of the commonest emergencies encountered in the pediatric age group. It has been recognized from many years as the principle challenge to the diagnostic acumen of pediatrician and therapeutic skill of surgeon. There was a tendency in past for surgeon to anticipate failure in managing pediatric obstruction specially in neonates but scenario has changed gradually in last few decades with improvement in methods of diagnosis, greater understanding of pathophysiology, availability of trained specialised personnel, safer anaesthesia, better antibiotics and much improved pre and post operative intensive care<sup>1</sup>.

**Material and Methods:** The present retrospective cum prospective study was conducted by reviewing the record of patients admitted with signs and symptoms and diagnosis of intestinal obstruction in Department of General Surgery, S.P. Medical College and Associated Group of Hospitals, Bikaner during 3 years period (January 2010 to December 2012).

**Summary and Conclusions:** Most of the cases (62.9%) presented below one year of age and male to female ratio of 4.4:1 was observed. Congenital pathology most commonly occur in neonatal age group. The high mortality in past was due to delayed diagnosis and referral, parental neglect, low socioeconomic status, anaesthetic complications and lack of neonatal intensive care. But of late the mortality is coming down due to increased awareness, early referral, availability of staff trained in neonatal handling and better antibiotics.

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### INTRODUCTION

Intestinal obstruction is one of the commonest emergencies encountered in the pediatric age group. It has been recognized from many years as the principle challenge to the diagnostic acumen of pediatrician and therapeutic skill of surgeon. There was a tendency in past for surgeon to anticipate failure in managing pediatric obstruction specially in neonates but scenario has changed gradually in last few decades with improvement in methods of diagnosis, greater understanding of pathophysiology, availability of trained specialised personnel, safer anaesthesia, better antibiotics and much improved pre and post operative intensive care<sup>1</sup>.

The pathophysiology of intestinal obstruction in children is similar to that of adults except that in children various congenital lesions may be responsible for obstruction. More over exact requirement of fluids and electrolytes has to be considered during resuscitation of children. Also since the reserves are small, infants should be monitored for fluid and electrolyte and blood losses. During surgery even a small amount of blood loss may require blood transfusion in infants.

Various causes of intestinal obstruction are described in pediatric age group. Belokar *et al*<sup>2</sup> mentioned the list of the same as Infantile hypertrophic pyloric stenosis, Intussusception, Intestinal atresias, Hirschsprung's disease, Meckel's diverticulum, Meconium ileus, Volvulus & Malrotation, Imperforate anus, Ascariasis, Annular pancreas, Tuberculosis and Adhesions etc.

The causes of acute intestinal obstruction vary from country to country and from region to region<sup>3-6</sup>.

The signs and symptoms of intestinal obstruction are basically the same as in adults. Most of these patients present with failure to pass meconium /stool, distension of abdomen, pain and vomiting with fluid & electrolyte imbalance. For diagnosis a detailed history and various factors like age of the patient, rapidity of onset, character of vomitus may give a clue. According to age infantile hypertrophic pyloric stenosis commonly occurs around 3 weeks of age where as intussusception is most commonly seen in healthy children around 6-11 months of age. Most of the cases of intestinal obstruction due to congenital causes like imperforate anus, atresias etc will present at birth or soon after birth where as complications of malrotation may occur any time after birth.

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The onset of signs and symptoms also give some idea about cause for example the onset of symptoms may be chronic and intermittent in case of Hirschsprung's disease where as acute onset of intestinal obstruction suggests volvulus of gut or conditions like intussusception. In Infantile hypertrophic pyloric stenosis the onset may be slow with the patient not even appearing ill and shows eagerness to feed.

The character of vomitus also plays an important role in diagnosis. Bilious vomiting soon after birth is suggestive of high intestinal obstruction like duodenal/jejunal/ileal obstruction. If vomitus is free of bile then diagnosis of gastric outlet obstruction like infantile hypertrophic pyloric stenosis can be made. The vomitus in these cases may also contain curdled milk and rarely blood because of gastritis. Later the onset of vomiting, distal is the site of obstruction. Vomiting if not taken care off will rapidly lead to dehydration and dyselectrolytemia, with possible aspiration leading to pneumonitis.

The abdominal distension may be absent or negligible in cases of gastric outlet obstruction and duodenal obstruction where as the abdomen may be grossly distended in Hirschsprung's disease where the obstruction is distal. The abdominal distension can cause splinting of diaphragm leading to embarrassment of respiration.

Radiological investigations like x-ray flat plate abdomen in erect and supine position demonstrates multiple air fluid levels and dilated loops which are diagnostic of intestinal obstruction<sup>7</sup>. Dye studies like barium meal and barium enema may be used in diagnosis to find out the cause of intestinal obstruction. Ultrasound also plays an important role in diagnosis of intestinal obstruction in doubtful cases e.g. infantile hypertrophic pyloric stenosis<sup>8</sup>. The pyloric tumour and assessment of length of pyloric canal can be made with ultrasound. Similarly ultrasound can also detect the lump in cases of intussusception. Prenatal ultrasound can also detect various congenital gastrointestinal conditions like duodenal obstruction, small bowel obstruction etc<sup>9</sup>.

Rectal biopsy is helpful in diagnosis of Hirschsprung's disease. New diagnostic aids e.g. cytochemical analysis of various enzymes (Acetylcholinesterase) in rectal biopsy helps in confirmation of Hirschsprung's disease<sup>10</sup>.

Successful treatment of acute intestinal obstruction depends upon judicious combination of several procedures. They include decomp-reSSION of the intestine by intubation that also prevents aspiration pneumonitis; replacement of water, electrolytes, plasma and blood, and administration of antibiotics and operation that is specific treatment<sup>11</sup>.

Distended loops of intestine in an obstructed infant may lead to perforation & peritonitis, electrolyte imbalance and aspiration pneumonitis, hence early diagnosis in pediatric intestinal obstruction is of paramount importance so that timely surgical intervention may be under taken.

Imperforate anus and other anorectal malformations are the separate entity. So these are not included in this study.

## Classification And Etiology<sup>12-14</sup>

### *Intestinal obstruction is of two types*

1. Dynamic (mechanical) where peristalsis is working against mechanical obstruction.
2. Adynamic where peristalsis is absent.

### *It is divided on the basis of*

- Speed of onset
- Site
- Nature of obstruction
- Etiology

### *Speed of onset determines whether the obstruction is*

- a. **Acute:** Sudden onset of severe colicky abdominal pain, distention with early vomiting and constipation.
- b. **Chronic:** usually seen in large bowel obstruction with lower abdominal colic and absolute constipation followed by distention.
- c. **Acute on chronic:** There is a short history of abdominal distention and constipation followed by distention.
- d. **Sub acute:** Implies an incomplete obstruction.

### *Depending upon the site of obstruction is divided into*

- e. High small bowel obstruction
- f. Low small bowel obstruction
- g. Large bowel obstruction

### *Nature of obstruction*

1. Simple : where blood supply is intact
2. Strangulating/strangulated : whether there is direct interference to blood flow

### *Based on etiology*

1. Intraluminal
2. Intramural
3. Extramural

### **Lesions intrinsic to the Intestinal wall**

#### *Congenital*

- A. Malrotation
- B. Intestinal atresia/stenosis
- C. Aganglionic mega colon
- D. Imperforate anus
- E. Meckel's diverticulum
- F. Duplication/Cyst

#### *Acquired*

#### *Inflammatory*

#### *Infections*

- A. Tuberculosis

B. Diverticulitis

**Neoplastic**

1. Colonic carcinoma
2. Carcinoid tumor
3. Peutz-jegher syndrome

**Traumatic**

- i. Hematoma
- ii. Ischemic stricture

**Miscellaneous**

- iii. Intussusception
- iv. Meconium ileus
- v. Post ischemic stricture

**Lesion Extrinsic to the Intestinal Wall**

**Adhesions**

- a. Postoperative
- b. Congenital
- c. Post Inflammatory

**Hernia**

- d. Abdominal Wall (external)

- i. Inguinal
- ii. Femoral
- iii. Umbilical
- iv. Ventral

A. Intra abdominal wall (internal)

B. Postoperative

- i. Incisional
- ii. Parastomal
- iii. Wound dehiscence
- iv. Internal hernia of mesenteric defects

**Acquired**

**Congenital**

- a. Annular pancreas
- b. Volvulus
- c. Constricting bands
- d. Persistence of yolk sac
- e. Peritoneal encapsulation

**Inflammatory**

- f. Intra abdominal abscess
- g. Primary peritonitis

**Miscellaneous**

- h. Superior mesenteric artery syndrome

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 retrospective cum prospective study was conducted by reviewing the record of patients admitted with signs and symptoms and diagnosis of intestinal obstruction in Department of General Surgery, S.P. Medical College and Associated Group of Hospitals, Bikaner during 3 years period (January 2010 to December 2012).

The patients of acute intestinal obstruction were studied in detail from their history, examination and investigations like X-ray flat plate abdomen, barium enema, barium meal, ultrasound abdomen, rectal biopsy etc wherever necessary.

Each patient was reviewed in terms of age, sex, symptomatology, diagnosis, treatment and ultimate outcome. These cases were screened out in following manner as mentioned under the heading of Proforma.

**Observations**

**Table 1** Distribution of cases according to age group in relation to Final Diagnosis

Age Group	Final Diagnosis				Total	
	Acquired		Congenital		No.	%
<1m	No. 15	% 9.9	No. 55	% 46.2	No. 70	% 25.9
1m – 1 y	No. 77	% 51.0	No. 23	% 19.3	No. 100	% 37.0
1.1y-5y	No. 33	% 21.9	No. 33	% 27.7	No. 66	% 24.4
>5 y	No. 26	% 17.2	No. 8	% 6.7	No. 34	% 12.6
Total	No. 151	% 100	No. 119	% 100	No. 270	% 100
$\chi^2$					58.577	
p					<0.001	

In present study, most common age group was 0-1 year which consisted of 170 patients out of them 92 patients had acquired and 78 had congenital pathology.

Age group 1-5 years consisted of 66 patients and out of them 33 had acquired and rest had congenital pathology.

Least common age group was >5 years consisting of 34 patients. Out of them 26 and 8 had acquired and congenital pathology respectively.

On applying chi square test, the difference was found statistically highly significant (p<0.001).

In present study, male predominated over females. Out of total 270 patients, 220 were males and 50 females. Out of 220 males, 119 had acquired and 101 had congenital pathology.

**Aims And Objectives**

Out of 50 females, 32 had acquired and 18 had congenital pathology and this difference was also found insignificant ( $p>0.05$ ).

Significant finding was observed radiologically in 77.5% of patients whereas Significant finding in sonographically was found in 20%.

In present study, most common presenting symptom was vomiting which was present in 82.6% cases followed by constipation (63%), distension (61.1%), dehydration (49.6%), Pain abdomen (28.1%), Lump Abdomen (25.9%), blood and mucus in stool (22.6%)

In the present study, out of total 270 patients, 246 were Hindus and 24 Muslims.

Out of 246 Hindus, 141 had acquired and 105 had congenital pathology.

Out of 24 Muslim patients 10 had acquired and 14 had congenital pathology respectively.

On applying chi square test the difference was found statistically insignificant ( $p>0.05$ ).

**Table 2** Distribution of cases according to etiological incidence

Etiology	No. of Cases	%
Intussusception	62	23.0
Hirschsprung's Disease	37	13.7
Intestinal Atresia	37	13.7
Infantile hypertrophic pyloric stenosis	27	10.0
Band Obstruction	21	7.8
Intestinal Obstruction with Peritonitis	13	4.8
Post Operative Adhesion	11	4.1
Volvulus & Malrotation	12	4.4
Meckel's Diverticulum	9	3.3
Obstructed External Hernia	8	3.0
Inflammatory Adhesion Obstruction	8	3.0
Meconium Obstruction & Meconium Peritonitis	3	1.1
Miscellaneous		
Paralytic Ileus	7	2.6
Tubercular Obstruction	6	2.2
Fecolith Obstruction	3	1.1
Mesentric Cyst	2	0.7
Patent VID	1	0.4
Annular Pancreas	1	0.4
Worms Obstruction	1	0.4
Intestinal Obstruction with LBW	1	0.4
Total	270	100

**Table 3** Distribution of cases according to complication

Complication	Final Diagnosis				Total	
	Acquired		Congenital		No.	%
Nil	146	967	117	98.3	263	97.4
Burst Abdomen	0	-	1	0.8	1	0.4
Fecal Fistula	1	0.7	1	0.8	2	0.7
Required Re-exploration	1	0.7	0	-	1	0.4
Secondary Suturing	2	1.3	0	-	2	0.7
Wound Sepsis	1	0.7	0	-	1	0.4
Total	151	100	119	100	270	100
$\chi^2$			4.468			
p			0.484			

In present study, intussusception was most common pathology. Next in frequency was Intestinal Atresia (23%), Hirschsprung's

disease (13.7%), Infantile hypertrophic pyloric stenosis (10%), Band Obstruction (7.8%), Intestinal obstruction with peritonitis (4.8%), Postoperative adhesion (4.1%) and volvulus & malrotation (4.4%) in decreasing order.

In present study, out of total 270 patients, 1 patient of congenital pathology had burst abdomen. Whereas 2 patients suffered from fecal fistula. One patient had re-exploration for burst abdomen, 2 patients required secondary suturing and 1 patients had wound sepsis.

In present study, out of total 270 patients, 21(7.8%) died of various complications.

Out of them 14 had acquired and rest had congenital pathology In this study, out of total 21 mortality, 12 patients were of <1 month age group.

6 patients expired in age group 1months to 1 year and 3 patients in age group >1 year.

**Table 4** Operative mortality related to disease

Operative Pathology	Mortality				Total	
	Alive (n=201)		Expired (n=7)		No.	%
Volvulus & Malrotation	11	5.5	0	-	11	5.3
Annular Pancreas	1	0.5	0	-	1	0.5
Band Obstruction	20	9.9	1	14.3	21	10.1
Hirschsprung's disease	23	11.4	0	-	23	11.1
Infentile Hypertropic Pyloric Stenosis	27	13.4	0	-	27	13.0
Inflammatory Adhesion Obstruction	7	3.5	0	-	7	3.4
Intestinal Atresia	33	16.4	4	57.1	37	17.8
Intussusception	52	25.9	1	14.3	53	25.5
Meconium Peritonitis	1	0.5	0	-	1	0.5
Meckel's Diverticulum	9	4.5	0	-	9	4.3
Mesentric Cyst	2	1.0	0	-	2	0.9
Multiple Perforation & Peritonitis	0	-	1	14.3	1	0.5
Obstructed External Hernia	8	3.9	0	-	8	3.9
Patent VID	1	0.5	0	-	1	0.5
Post Operative Adhesion	3	1.5	0	-	3	1.4
Primary Peritonitis	3	1.5	0	-	3	1.1

**Table 5** Management and mortality rate

Management	Mortality				Total	
	Alive		Expired		No.	%
Adhesionolysis	7	2.8	0	-	7	2.6
Appendectomy	2	0.8	0	-	2	0.7
Ba Reduction	1	0.4	0	-	1	0.4
Band Lysis	15	6.0	0	-	15	5.6
Colostomy	24	9.6	0	-	24	8.9
Correction	3	1.2	0	-	3	1.1
Duodeno Duodenostomy	6	2.4	1	4.8	7	2.6
Derotation	5	2.0	0	-	5	1.9
Derotation & Appendectomy	1	0.4	0	-	1	0.4
Diverticulectomy	6	2.5	0	-	6	2.2
Hermiotomy	5	2.0	0	-	5	1.9
Ileostomy	4	1.6	0	-	4	1.5
Manual Reduction	25	10.0	0	-	25	9.3
Pyloromyotomy	27	10.8	0	-	27	10.0
Resection and Anastomosis	66	26.5	6	28.6	72	26.7
Resection	1	0.4	0	-	1	0.4
Side to Side Anstomosis	1	0.4	0	-	1	0.4
Toileting	3	1.2	0	-	3	1.1
Conservative	45	18.1	14	66.7	59	21.9
Total	249	100	21	100	270	100

In present study, according to operative pathology, 4 patients of intestinal atresia expired.

1 patient each died of band obstruction, Intussusception and multiple perforation and peritonitis.

In this present study, out of total 21 deaths, 6 patients expired after Resection and Anastomosis.

While 1 patient expired after to duodeno duodenostomy. 14 patients expired from group who managed conservatively.

## DISCUSSION

This study includes 270 cases of intestinal obstruction in paediatric age group admitted during a period of 3 years (1.01.2010 to 31.12.2012) in the department of Pediatric Surgery, S.P. Medical College, Bikaner.

Intestinal obstruction accounted for 7.4% out of total admissions (3665) in the Department of Pediatric Surgery. Adejuyigbe and Fashakin<sup>15</sup> have reported an incidence of intestinal obstruction to be 1.03% of total pediatric admissions during a 7 years of period. Different authors have reported the incidence of intestinal obstruction to vary between 1 and 5.3% of all surgical admissions of all age groups. The higher incidence in the present study is due to the fact that there is an increased level of awareness among the rural population regarding child care, better and quick means of transport and easy availability of pediatrician who can diagnose obstruction in neonates and children early. Being a medical college hospital and better community health centers in the tehsil and rural area, more and more patients are diagnosed early and referred to the only developed paediatric surgery department here.

Maximum number of cases of obstruction were in the age group of 0-1 years (62.9%) followed by 24.4% in 1-5 years of age and 12.6% of more than 5 years (Table 1).

Belokar *et al*<sup>2</sup> in their series of 67 cases reported an incidence of 34.3% for the age group of 0-1 year and another (34.3%) for 1-5 years and (31%) for more than 5 years.

Another study from Nigeria reported by Archibong *et al*<sup>16</sup> had an incidence of 38.3% cases less than 1 year where as he reported maximum cases (40.6%) to be more than 5 years of age.

In another study, Uba *et al*<sup>17</sup> observed 74% for <1 year of age and rest 26% were more than 1 year.

In present study, incidence of congenital pathology commonly occurs below 1 year age.

In present study, out of a total 270 cases of intestinal obstruction, 220(81.21%) males and 18.79% females.

Male to female ratio 4.4:1

Sran *et al*<sup>6</sup> reported in his series from India a M:F ratio of 2:1. In the year 2004, Uba *et al*<sup>34</sup> observed male to female ratio 4.4:1 which is quite similar to our study.

The important reason of male predominance is due to the fact that most of the lesions requiring surgical intervention e.g. infantile hypertrophic pyloric stenosis, intussusception etc are more common in males and also due to a general feeling of female neglect, illiteracy and various socioeconomic factors prevailing in this part of the country.

In present study, clinical features included vomiting (82.6%), constipation (63%), abdominal distension (61.1%), abdominal pain (28.1%), abdominal lump (25.9%) and bleeding PR (22.6%)

In the year 2005, Momani *et al*<sup>18</sup> reported that the clinical features included vomiting (73.1%), abdominal pain (58.7%), abdominal distension (45.3%), constipation (37%), rectal bleeding (29.7%) and abdominal mass (25.6%).

In the year 2013, Soomro and Mughal<sup>21</sup> observed that the main presenting features were not passing stools (100%), pain abdomen (89.09%), vomiting (85.45%), abdominal distension (81.81%), fever (21.81%), bleeding per rectum (18.18%) and mass abdomen (16.36%).

Our study is comparable with the above studies and vomiting is the main clinical feature and other clinical features vary according to obstructive pathology

Intussusception was the most common (23%) cause of paediatric intestinal obstruction in the present series (Table 3) followed by intestinal atresia (13.7%). Hirschsprung's disease (13.7%). Infantile hypertrophic pyloric stenosis (10%), band obstruction (7.8%), (extramaculum and inflammatory band), malrotation and volvulus (4.4%), postoperative adhesion (4.1%) and Meckel's Diverticulum 3.3%, peritonitis 4.8%, obstructed external hernia 3%.

In the year 1989, Adejuyigbe and Fashakin<sup>15</sup> reported a series of 76 cases during 7 years period and found that intussusception was seen in 44.7% of case, followed by peritoneal adhesions (22.4%), obstructed hernia 918.4%), round worm impaction (5.3%) volvulus (4%) while fecal impaction and mesenteric cyst were seen in 2.6% each.

In the year 2005, Momani *et al*<sup>18</sup> showed that the causes of intestinal obstruction were: intussusception (35.6%), postoperative adhesions (19%), inguinal hernias (11.1%), Hirschsprung's disease (6.9%), malrotation (5.9%), intestinal atresias and stenosis (2.3%), congenital bands (2.3%), Meckels diverticulum (1.6%).

In the year 2009, Ogunyoyin *et al*<sup>19</sup> described that the major causes of intestinal obstruction in their study were intussusception (29.23%), anorectal malformations (22.31%), obstructed inguinoscrotal hernia (16.92%) and Hirschsprung's disease (13.85%).

In the year 2013, Soomro and Mughal<sup>21</sup> found that the causes of intestinal obstruction were intussusception (27.3%), Meckel's diverticulum with band causing obstruction (16.4%), obstructed inguinal hernia (14.5%), post operative adhesions (9.1%), congenital peritoneal bands (7.3%), Hirschsprung's

disease (7.3%), abdominal tuberculosis (5.5%), typhoid ileal perforation (5.5%), malrotation (3.6%) and umbilical hernia (3.6%).

Our study is compatible with most of the above mentioned studies in which intussusception was the most common cause of pediatric intestinal obstruction. The incidence of obstructed external hernias was less in our study in comparison to others that ranked second most common cause of intestinal obstruction. This is because of the fact that our policy has been to reduce the obstructed hernia in every case and then do a planned herniotomy. Another important reason for getting lesser number of obstructed hernias in the present series may be due to our policy of routine elective herniotomy as soon as diagnosis is made, even in a newborn.

In one series ascaris worm obstruction has found as the common cause of intestinal obstruction, but we have seen only one case of ascaris worm obstruction in last 3 years which was treated conservatively. Hence the cause of worm obstruction may vary from one geographical area to another. Some series included imperforate anus but was excluded from present series because it is a separate entity.

Overall mortality was 7.8% but neonatal mortality was 17.1% in the present series.

In the year 1973, [Sran et al<sup>6</sup>](#) reported neonatal mortality rate of 76% but [Olumide et al<sup>13</sup>](#) showed neonatal mortality rate to be 33%.

In the year 1978, [Belokar et al<sup>2</sup>](#) reported a series of 67 cases from India and found that overall mortality in intestinal obstruction of paediatric age group was 23.88% but neonatal mortality rate was 43.5%.

In the year 1989, [Adejuyigbne and Fashakin<sup>15</sup>](#) reported overall mortality rate to be 21.1%.

In the year 1994, [Archibong et al<sup>16</sup>](#) described overall mortality rate as 12.6%.

In the year 2004, [Uba et al<sup>17</sup>](#) found that the overall mortality was 6(11.1 %); the mortality in the neonates was 5(33.3 %).

In the year 2009, [Ogundoyin et al<sup>19</sup>](#) in their study found that the mortality rate was 3.08% and most (75%) occurred in neonates.

In the year 2012, [Saha et al<sup>20</sup>](#) found that overall mortality after initial surgical treatment was 16%.

In the present series the overall mortality had been 7.8% and neonatal mortality rate of 17.1%. This can be attributed to lack of intensive neonatal care unit, lack of expert nursing manpower, anaesthesia related complications, delayed presentation and poor immune response of newborns.

The overall mortality has been improving of late due to better awareness, early diagnosis, improved anaesthesia technique, availability of better antibiotics and above all rapid development of modern pediatric surgery department.

Most of the cases (77%) were managed by operative intervention with an overall operative mortality rate of 3.4%. the main causes of mortality included anaesthetic complications, septicemia, hyper/hypothermia, lack of neonatal intensive care unit etc. Rest of the cases (23%) were managed conservatively. These include obstruction due to intussusception (reduced by hydrostatic pressure enema), postoperative adhesions, tubercular abdomen, fecal impaction and motility disorders. This also includes a few cases which died, before any surgical intervention could be under taken, due to septicemic shock, fluid and electrolyte imbalance and aspiration pneumonia all due to patients being brought late to the hospital. The overall mortality rate in conservative managed cases was 22.6%. Those cases left against medical advice were included in this conservative treatment

In our study intestinal atresia carried the maximum operative mortality of (4/7) (57.1%) followed by band obstruction (1/7) (14.3%), intussusception (1/7) (14.3%), multiple perforation peritonitis (1/7) (14.3%).

Among intestinal atresia cases the main reasons for mortality was septicemia nonfunctioning anastomosis and aspiration pneumonia. Proximal the site of atresia more was the mortality in present series. It is probably due to increase incidence of associated anomalies and inability to sacrifice the required amount of dilated proximal bowel. 1 case of operated band obstruction expired postoperatively due to septicemia. One case who died of peritonitis had multiple perforations of the terminal ileum (resection anastomosis) secondary to necrotizing enterocolitis. One out of 53 cases of intussusception died postoperatively. This case had gangrenous intussusception managed by resection and anastomosis who went into septicemia. The most common cause of mortality was delayed presentation with septicemia and dyselectrolytemia present at the time of admission and massive resections which some cases required.

## SUMMARY AND CONCLUSIONS

In the present study 270 cases of intestinal obstruction admitted in Department of pediatric surgery, S.P. Medical College, Bikaner were included during a period (from January 2010 to December 2012) of 3 years. This accounted for 7.4% of total admissions.

Most of the cases (62.9%) presented below one year of age and male to female ratio of 4.4:1 was observed.

Congenital pathology most commonly occur in neonatal age group.

The most common cause of intestinal obstruction was intussusception (23%) followed by intestinal atresia (13.7%), Hirschsprung's disease (13.7) and infantile hypertrophic pyloric stenosis (10%), band obstruction (7.8%), malrotation and volvulus (4.4%) and postoperative adhesion (4.1%) etc.

The clinical presentation included vomiting, pain abdomen, abdominal distension, constipation, bleeding PR and palpable abdominal mass. In most of the cases these clinical features

were diagnostic of intestinal obstruction and were supplemented by X-ray abdomen, ultrasonography and other special investigations where ever indicated.

Approximately 77% of cases were managed surgically and rest managed conservatively. Maximum mortality was observed in newborns specially in cases of intestinal atresia that too in cases which came to hospital late and in poor general condition or with other associated anomalies. Most common complication of surgery was wound sepsis.

The high mortality in past was due to delayed diagnosis and referral, parental neglect, low socioeconomic status, anaesthetic complications and lack of neonatal intensive care. But of late the mortality is coming down due to increased awareness, early referral, availability of staff trained in neonatal handling and better antibiotics.

**With the present study we have drawn the conclusion as follows**

1. The most common cause of intestinal obstruction in pediatric age group was intussusception.
2. The overall status of diagnosis after clinical assessment was X-ray abdomen having multiple fluid levels and USG was diagnostic in certain entities like infantile hypertrophic pyloric stenosis, intussusception etc.
3. Morbidity and mortality is significantly reduced by early diagnosis and surgical management.
4. Mainstay of treatment for intestinal obstruction is surgery.
5. "Earlier the surgery better the results".

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