

Clinical outcome of intestinal obstruction in pediatric age group: A prospective study

Shivprasad Hirugade^{1*}, Harish N Patil², Amit Chopade³, Shilpa S Hirugade⁴

¹Associate Professor, ²Assistant Professor, ³Resident, Department of General Surgery, RSCSM Government Medical College, Kolhapur,

⁴Consultant Pediatrician, Apple Hospital and Research Center, Kolhapur, Maharashtra.

Email: hirugade@gmail.com

Abstract

Background: Intestinal obstruction is one of the commonest cause of pediatric surgical emergency with a high morbidity and mortality. Very few previous studies address the problem regarding clinical outcome of these patients especially in Indian context. **Materials and Methods:** A two year (April 2011 to June 2013) prospective study of hundred consecutive pediatric intestinal obstruction cases aged 1 day to 12 yrs presenting at RSCSMGMC and CPR hospital, Kolhapur was done to assess the pattern and factors affecting the outcome. **Results:** Hundred (100) children with male to female ratio of 1.1:1 were seen during study with peak incidence seen in neonates (40). The median duration of symptoms was 48 hrs (range 1hr to 10 days) with 52% of the delayed cases (more than 48 hrs) being previously treated symptomatically and referred. In present study, Intussusception was the commonest cause of obstruction in 20% of patients. Anorectal malformations were close second with total incidence of 19% followed by Hirschsprung's disease (16%), Intestinal Atresias (8%), Adhesive obstruction (7%), Necrotizing enterocolitis (7%). Perforative peritonitis, Congenital Hypertrophic Pyloric Stenosis, Intestinal Malrotation, Meckel's Diverticulitis, Obstructed Exemphalos and worm obstruction were seen in 3% patients each. Obstructed Inguinal hernia (2%), Umbilical Hernia (1%), Meconium illeus(1%), Meconium plug syndrome (1%) were other causes. 61 cases were due to acquired causes while the rest were congenital causes. Also small bowel obstruction was more common than large bowel obstruction (65% as compared to 35%). Postoperative complications were seen in 39% cases with wound infection (17%) and wound dehiscence (9%) being the commonest. The mean hospital stay was 10.25 days (SD=5.14) , which was affected significantly by malnutrition (p=0.00027) and delayed presentation (p=0.018). Mortality rate was 6% with overwhelming sepsis (66%) and multiple congenital anomalies (33.33%) being the commonest causes. Mortality was more in neonatal group (83.33%). **Conclusions:** With improving health care, while mortality as an outcome of management is low, the morbidity is still on higher side in pediatric obstruction cases. Neonatal age, malnutrition and low birth weight in neonates, delay in presentation and delayed referral from primary health centers and general practitioners adversely affects the morbidity. **Key words:** Intestinal obstruction, pediatric, surgical emergency.

* Address for Correspondence:

Dr. Shivprasad Hirugade, Associate Professor, Department of General Surgery, RSCSM Government Medical College, Kolhapur, Maharashtra, INDIA.

Email: hirugade@gmail.com

Received Date: 10/07/2016 Revised Date: 15/08/2016 Accepted Date: 05/09/2016

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 15 September 2016

INTRODUCTION

Intestinal obstruction is the commonest surgical emergency in children apart from acute appendicitis.¹ It is the most common indication of laparotomy in pediatric

patients and also forms an important cause of mortality and morbidity in them.^{2,3}

Bowel obstruction in children differs from that in adults in terms of etiology, presentation and even the management. It also varies with age in children of different age group.^{4,5} Etiologically, intestinal obstruction in children can be divided into congenital anomalies and acquired ones. These include intestinal atresias, intussusception, adhesion, Hirschsprung's disease, malrotation, Meckel's diverticulitis, tuberculosis, obstructed hernias, worm obstruction and many rare causes.^{1,2,3,4,5,6} The clinical features ranges from abdominal pain, vomiting to hematochesia and obstipation depending on etiology.^{1,6,7}

Management of intestinal obstruction in pediatric patients is a big challenge to surgeons. The

pathophysiology of obstruction leading to electrolyte imbalance, septicemia tend to complicate the disease.^{7,8,9,10} Socioeconomic, demographic and time related factors affect the outcome of intestinal obstruction.⁹

The modern day surgical management of obstruction focuses appropriately on avoiding operative delay wherever surgery is indicated. The old adage "Never let the sun set or rise on small bowel obstruction" remains true to date more so in case of children.⁷

Pediatric population makes around 30-40% of total population in many countries including India.¹¹ Many factors affect the outcome of obstruction. The varied etiology, acute or chronic nature of symptoms, general condition of the patients, procedure required, delay in treatment and surgery are some of the important factors that affect the prognosis.¹² Parental ignorance, social beliefs and customs, faulty medical practices all lead to delayed presentation and predisposes to complications leading to increased mortality and morbidity.¹³

Various imaging modalities are being used for diagnosis of bowel obstruction as USG, X ray and CT scan with huge success.^{14,15}

Prompt recognition of need for operative intervention when clinically indicated remains cornerstone of modern day surgical management of acute intestinal obstruction.¹⁶ This study is an attempt to evaluate the outcomes of intestinal obstruction in children of various age group and study the factors influencing them in government setup in India.

MATERIALS AND METHODS

The study was conducted at Rajarshree Chhatrapati Shahu Maharaj Government Medical College and Chhatrapati Pramila Raje Hospital, Kolhapur, Maharashtra, India (RCSMGMC and CPRH). 100 cases of intestinal obstruction, admitted at RCSMGMC and CPR Hospital, Kolhapur were studied over two years from April 2011 to April 2013. Children of age birth to 12 yrs were considered for study.

Detailed history was obtained from parents (preferably mother). All clinical features, presentations physical examination findings were recorded. All relevant investigations like CBC, blood urea, creatinine, serum electrolytes, and Montoux test were performed and recorded. Different necessary imaging modalities like x-ray erect abdomen, ultrasound of whole abdomen and contrast enema were done and recorded. CT scan plain and contrast and barium studies were performed if needed.

Depending upon the suspected disease and clinical status of patient decision was taken regarding management. Mild obstruction of acquired cause was

managed conservatively with aggressive resuscitation with nasogastric tube for aspiration, isotonic IV fluids, intravenous antibiotics, inotropics if required, and blood transfusion if needed. Severe obstruction was treated with surgery and depending on the findings; necessary procedure was decided on table and performed. Surgical modalities were used in previously conserved patients where conservative management failed.

All the data collected was analyzed statistically expressing data values as percentages, mean, standard deviation or median values as per data type(qualitative or quantitative). The independent student 't' test was used as a test of statistical significance for quantitative data and chi-squared test for qualitative data. $p < 0.05$ was taken as significance value.

DISCUSSION

Intestinal obstruction is the commonest surgical emergency in children apart from acute appendicitis.¹ It is the most common indication of laparotomy in pediatric patients and also forms an important cause of mortality and morbidity in them.^{2,3} This study was an attempt to study causes, the clinical features, and management of intestinal obstruction in pediatric age group as well as to evaluate the outcomes of intestinal obstruction in children of various age group and study the factors influencing them. Acquired causes of obstruction were more than congenital causes (61% compared to 39%) in all age groups except neonates. Similar findings were found by Ogundoyin OO *et al*¹⁷, Belokar W *et al*¹⁸, Ratan SK *et al*⁵ and Gangopadhyay *et al*⁴. Also small bowel obstruction was more common than large bowel obstruction (65% as compared to 35%). This is similar to Ellis¹⁹ study where small bowel obstruction was responsible for 70% cases of obstruction and large bowel obstruction accounted for 30% cases.

Sex Distribution: In current study, the number of males affected is 54 and that of females is 46 with the male to female ratio being 1.1: 1. This finding differs from some studies like Annigeri VM *et al*²⁰ (3.6:1), Ademuyiwa AO *et al*²¹(4:1) but is similar to other studies Ellis *et al* (1:1)¹⁹, Soomro BA *et al*²² (1.9:1), Ogundoyin OO *et al*¹⁷(1.9:1), Ahmadi, J *et al*²³ (1.1:1).

Age Distribution: There was peak incidence in neonatal age group with 41% cases and 25% cases belonged to infant age group in this study (total of 66%). Similar findings were seen in Annigeri VM *et al*²⁰ (77%), Ratan SK *et al*⁵(58%), Ogundoyin OO *et al*¹⁷ (61.5%) suggesting that neonates and infants are affected more than older children. However in some studies like Belokar W¹⁸ (23%), Soomro BA *et al*²² (39%) reverse trend was seen.

Symptomatology: In our study, vomiting was the most common symptom of presentation with 77% incidence followed by constipation (66%), abdominal distension (65%) and abdominal pain (60%). Comparable findings were noted by Ogundoyin OO *et al*¹⁷.

Etiology: In present study, Intussusception was the commonest cause of obstruction in 20% of patients. Anorectal malformations were close second with total incidence of 19% followed by Hirschsprung's disease (16%), Intestinal Atresias (8%), Adhesive obstruction (7%), Necrotizing enterocolitis (7%). Perforative peritonitis, Congenital Hypertrophic Pyloric Stenosis, Intestinal Malrotation, Meckel's Diverticulitis, Obstructed Exemphalos and worm obstruction were seen in 3% patients each. Obstructed Inguinal hernia (2%), Umbilical Hernia (1%), Meconium illeus (1%), Meconium plug syndrome (1%) were other causes.

Ogundoyin OO *et al*¹⁷ study shows similar results with Intussusception (29.23%), ARM (22.3%) obstructed inguinoscrotal hernia (16.92%) and Hirschsprung's disease (13.8%) as common causes. Hussain I *et al*²⁴ found that Intussusception (40%), Adhesive obstruction (18%), Hirschsprung's disease (12%) were the commonest causes.

Archibong AE *et al*²⁵ found that worms (25%) and intussusception (22%), imperforate anus (11%), volvulus (10%), external hernias (9%) and adhesions (7%) were common causes of intestinal obstruction. Ahmadi, J *et al*²³ study showed that obstructed hernia (17.7%), atresia (16.4%), malrotation (13.8%), ARM (12.5%) were the main etiological factors. Annigeri VM *et al*⁸⁹ found that Intestinal atresia (22.4%) was the commonest cause followed by intussusception (18%), Congenital hypertrophic pyloric stenosis (18%), malrotation (13%).

Belokar W *et al*²⁶ showed Intussusception (31%) followed by Obstructed hernia (23.8%), ARM (16.4%) was common etiology. Similarly, Gangopadhyay *et al*⁴ and Ratan SK *et al*⁵ found that intussusception was the commonest cause of obstruction in pediatric population (16% and 20.8% respectively). Ghritlaharey RK *et al*² showed that perforative peritonitis is leading cause with 34% incidence followed by intussusception (26%) and malrotation (23%).

Comparative analysis of etiology of neonatal intestinal obstruction: Anorectal anomalies (47.5%) are the most common cause of intestinal obstruction followed by, intestinal atresia (20%), Necrotizing enterocolitis (10%) Hirschsprung's disease (7%), Obstructed exemphalos (5%), Meckel's diverticulum, meconium ileus, Intussusception and meconium plug syndrome which have an equal contribution of 2.5% each. The Gangopadhyay⁴ study shows similar results with

anorectal anomalies (50.3%) being the leading cause followed by Hirschsprung's disease (15.7%), bowel atresia (7.8%) and malrotation of the gut (5.9%).

In the study by Ameh *et al*⁹, Anorectal malformations (68.9%) were the most common cause of neonatal intestinal obstruction, followed by Hirschsprung's disease (7.3%), incarcerated herniae (7.3%), intestinal atresia (6.7%). Other less common causes in their study were incarcerated exomphalos, malrotation, hypertrophic pyloric stenosis, annular pancreas, idiopathic ileal volvulus and meconium ileus.

Anorectal malformation: All cases of ARM were seen in neonatal age group. The mean age was 1.7 days (range of 1 day to 3 days). 58% (11 cases) patients were Males and 42% (8 cases) were Females. (M: F = 1.4:1).

Level of anomaly: Low level anomalies (58%) are more common than high level ones (42%) in our study. However high level anomalies were found to be more common than low level anomalies by Adejuyigbe *et al*²⁶ (69.8%), Ameh EA *et al*⁹ (86.5%).

Hirschsprung's disease: In the current study, peak incidence of hirschsprung's disease was found in Infancy, followed by preschoolers and then neonates. Ratan SK *et al*⁵ found almost equal incidence in all three age groups.

Comparison of clinical presentation of Hirschsprung's disease: Abdominal distension, constipation, Vomiting are the common modes of presentation of Hirschsprung's disease in our study. Males 10 (62.5%) are affected more commonly than females 6 (37.5%) in the present study. The male to female ratio in the present study is 1.7:1. In the study by Klein²⁷ *et al*, the male to female ratio is 3.3:1, males being more commonly affected.

In the study by Stepanova *et al*²⁸, abdominal distension, constipation, vomiting and a history of delayed passage of meconium were the most common modes of presentation. In the study by Klein⁶⁷ *et al*, constipation (80%) and abdominal distension (80%) were the most common presenting symptoms. 60% of cases had history of delayed passage of meconium and 58% of cases had history of vomiting. These results are comparable to our findings.

Intussusception: In present study, Intussusception is the commonest cause of obstruction (20%). Peak incidence was observed in Infancy (1 month - 1 yr age) with 50% cases of intussusception seen in this age group. Overall Male to Female ratio was 1:1 for intussusception cases. Also Ileocolic intussusception was the commonest type observed (70%) followed by illeo-ileal (30%). No colocolic type was observed. Pathologic lead point was found in only 2 cases (10%) and was found to be Meckel's diverticulum in both cases. Similar peak incidence in infancy in cases of intussusception was observed by Annigeri VM *et al*²⁰ (76%), Gangopadhyay

*et al*⁴ (77%). Ratan SK *et al*⁵(73%), Ogundoyin OO *et al*¹⁷, Carneiro PMR *et al*²⁹ (75%), Ghritlaharey RK *et al*² (76%), Crankson SJ *et al*¹⁰ (94%). The sex distribution (M:F=1:1) is similar to that found by Soomro BA *et al*²². Gangopadhyay *et al*⁴ found that ileocolic intussusception (24 cases; 61.5%) was the most common type followed by ileoileal (9 cases; 23%) and ileo-ileocolic (6 cases; 15.3%). A lead point was found in 9 cases (23%) the remainder being idiopathic.

Clinical presentation: As we can see vomiting, abdominal pain, PR bleed, lump per abdomen are common clinical features of intussusception.

Adhesive obstruction: There were 7 cases of postoperative adhesive obstruction. Previous surgery of appendectomy was responsible for 4 of those (57%) cases. Previously operated PSARP, pull through repair and laparotomy for necrotizing enterocolitis accounted for one case (14%) each.

Out of the 7 cases 3 cases (all post appendectomy) were successfully managed with conservative treatment. The rest (57%) had to be operated. This success rate (43%) of conservative management is comparable to that found by K vijay *et al*⁸(52%). In current study there were only 3 cases of worm obstruction and were managed by conservative management alone. Similar decrease in incidence of worm obstruction was seen in some studies³⁰.

Associated anomalies: There was 18% incidence of associated anomalies in present study population. The incidence of associated anomalies was higher in congenital obstruction cases than acquired ones (98% as compared to 2% incidence.) Especially higher incidence was seen in Anorectal malformations. This was also shown by Ameh EA *et al*⁹ and Saha AK *et al*³¹.

Post operative complications: In present study, postoperative complications were seen in 39% cases with some cases developing more than one complication. Wound infection (incidence 17%) was the commonest cause followed by wound dehiscence (incidence 9%), respiratory infection (8%), Fever (4%), and skin infection (3%). A direct relationship was observed in development of complication and increased hospital stay with mean hospital stay increases to 14.4 days from mean of 7.6 days in non complicated cases.

Similar findings were found by Belokar W *et al*¹⁸ with wound infection being the most common complication (incidence-23%) followed by respiratory infection (19.4%), electrolyte imbalance (14.9%). Ogundoyin OO *et al*¹⁷ showed that wound infection was indeed most common complication with incidence of 20.77%. This was succeeded by post operative fever (12.31%), wound dehiscence (9.23%), septicemia (7.69%). Abubaker AM *et al*¹² found total complication rate of 33.9% with wound

infection (12.4%) and wound dehiscence (9.2%) as commonest complications.

Mortality: The total mortality in the present study is 6%. Neonates form major part of this group with 5 cases out of 6 (83%). Similar findings were found in Belokar W *et al*¹⁸(43.5%), Uba AF *et al*³²(33.3%), Ademuyiwa AO *et al*²¹, Ameh EA *et al*⁹(21%), Adejuyibge O *et al*²⁶(44.6%).

This may be due to high incidence of associated multiple anomalies in neonates. Also, neonates have intrinsic challenges related to transition of fetal life to post natal one. These may lead to hypoglycemia, hypocalcemia, poor cardiovascular reserve. Also, they do not tolerate blood loss like adults, are prone to fluid overload, electrolyte imbalance. As a result, recovery from surgical stress is an uphill task for neonates and they are susceptible to septicemia, anemia, and respiratory complications leading to high mortality. Hence there is a decreasing trend of mortality over the years.

RESULTS

The present study includes 100 cases of intestinal obstruction satisfying the inclusion criteria, admitted at RCSMGMC and CPR Hospital, Kolhapur over two years from April 2011 to April 2013. Children of age 1 day to 12 yrs were considered for study.

Age distribution: Neonates formed the majority of cases (40%) of this study with Infants 25%, The Preschool age group 18% and children more than 5 years age group 17% of the study population.

Sex Distribution: Of the total 100 patients 54 were male as compared to 46 Females. (M: F ratio = 1.1:1).

Symptomatology: Vomiting was the commonest symptom (77%) followed by constipation(66%), abdominal distension(65%), abdominal pain/ excessive crying (60%), delayed/non passage of Meconium (25%), Lethargy (22%), absent anal opening (21%), and red jelly stools (11%).

Signs: Abdominal tenderness (68%), guarding (27%), rigidity (4%) and palpable lump per abdomen (14%) were the common signs seen.

Radiological Diagnostic Modalities: Plain X-ray Erect abdomen remains the mainstay of the radiological diagnosis of the Intestinal obstruction. In this study X-ray Erect abdomen was found to be helpful in diagnosis of majority (70%) cases, followed by Ultrasound of abdomen (58%), Barium studies (22%) and Invertogram (21%). Higher radiological modalities like CT scan, MRI were not required.

Etiology of Intestinal obstruction: In present study, Intussusception was the commonest cause of obstruction in 20% of patients. Anorectal malformations were (19%) followed by Hirschsprung's disease (16%), Intestinal

Atresias (8%), Adhesive obstruction(7%), Necrotizing enterocolitis (7%). Perforative peritonitis, Congenital Hypertrophic Pyloric Stenosis, Intestinal Malrotation, Meckel's Diverticulitis, Obstructed Exemphalos and worm obstruction were seen in 3% patients each. Obstructed Inguinal hernia (2%), Umbilical Hernia (1%), Meconium illeus(1%), Meconium plug syndrome (1%) were other causes. Acquired causes of obstruction were more than congenital causes. (61% compared to 39%) in all age groups except neonates. Also small bowel obstruction was more common than large bowel obstruction.(65% as compared to 35%). In neonatal period Anorectal malformations were the most common cause (47.5%), followed by Intestinal atresias (20%), Necrotizing enterocolitis (10%), Hirschsprung's disease (7%), Obstructed Exemphalos (5%), Meconium illeus (2.5%), Meconium plug syndrome (2.5%), Meckel's Diverticulitis(2.5%), Intussusception (2.5%). In Infancy Intussusception was the commonest cause (40%) followed by Hirschsprung's disease(32%), Necrotizing enterocolitis(12%), Congenital Hypertrophic Pyloric Stenosis (8%), Obstructed Exemphalos (4%), worm obstruction(4%). In preschool (1yr to 5 yr) Intussusception was the commonest cause (33%) followed by Hirschsprung's disease (27.7%), Adhesive obstruction (11%) Perforative peritonitis, Congenital Hypertrophic Pyloric Stenosis, Intestinal Malrotation, Meckel's Diverticulitis and worm obstruction were seen in 5% each. In 5yr to 12 yr age group Adhesive obstruction(29.5%) was common most cause followed by Intussusception (17.6%), Perforative peritonitis, Malrotation, Obstructed Inguinal hernia were found in 11.7% each. Umbilical Hernia obstruction (5%) and worm obstruction (5%) were other causes.

Anorectal Malformation: All cases of ARM were seen in neonatal age group. The mean age was 1.7 days (range of 1day to 3 days). 58 % (11cases) patients were Males and 42 % (8 cases) were Females. Not passed Meconium, absent anal opening, distension, abnormal site of anus, vomiting, lethargy are common clinical features. Not passed Meconium (100%), absent anal opening (73.7%) and distension (57.9%) are the commonest complaints. vomiting is present only in 21% cases.

Level of Anomaly: Low levels (58%) are more common than high level (42%).

Hirschsprung's Disease: Of 16 patients of Hirschsprung's disease 8 (50%) presented in Infancy (1mth to 1 yr age), 3 patients were neonates (18.7%) and remaining were preschoolers (31.2%) 1yr to 5 yr age group. 10 (62.5%) patients were males and 6(37.5%) were Females.(M: F ratio=1.7:1). Abdominal distension (100%), constipation (100%) and vomiting (62.5%) are

the commonest presenting symptoms of Hirschsprung's disease.

Intussusception: This was the commonest cause of obstruction in this study. Of 20 patients of Intussusception, 10 (50%) presented in Infancy. 6 (30%) presented in 1yr to 5yr age group and 3 (15%) in above 5yr age group. only 1 (5%) case was seen neonates. The sex distribution of cases was 10 Males and 10 Females. (M:F ratio=1:1). Vomiting (100%), abdominal pain (100%) and red jelly stools (55%) were the common symptoms. In 9 cases, lump per abdomen was palpable (45%).

Types of Intussusception: Of the total 20 cases of Intussusception, Illeocolic were most common (70%) followed by Illeoileal (30%).

Intestinal Atresia: All the 8 cases of Intestinal Atresia presented in Neonatal age group with mean age of 2.7 days (range 1day- 5 days) and had 6 females (75%) as compared to 2 Males (25%). Vomiting, lethargy and distension are the common symptoms of atresia. There were 5(62.5%) duodenal atresia cases, 1 jejunal atresia (12.5%) and 2 Illeal atresias (25%).

Adhesive Obstruction: There were 7 cases of Adhesive obstruction. 5(71%) cases presented in age group 5yr to 12 yrs while 2 (29%) presented in preschool (1yr to 5yr) age group. No cases were found in infancy or neonates. Male to Female ratio was 4:3 (1.3:1). Abdominal pain (100%), vomiting (100%), distension (85%), constipation (57%) were common clinical features. Of the 7 cases, 4 were previously operated for Appendicectomy (58%), followed by PSARP, Pull through repair and NEC with 1 case each (14%). In this group we were able to manage 3(42%) cases (all previously operated for Appendicectomy) conservatively while 4 required exploration (58%).

Necrotizing Enterocolitis: Total of 7 cases of NEC were managed in our study. Amongst them, 4 cases (57%) were seen in neonatal age group and 3 in infancy (43%) with M:F ratio as 6:1. Abdominal distension (100%), constipation (100%), vomiting, pain and lethargy (85 % each) were common symptoms. Signs of peritonitis such as Tenderness (100%), guarding (71%) and rigidity (%) were also present in most cases. gangrene or non viable bowel was the intra operative finding in 71% cases.

Others: There were 3 cases of Congenital hypertrophic pyloric stenosis, 2 (67%) of which were in infants and 1 (33%) in 1yr - 5yrs age group. All 3 cases were Males and non bilious vomiting was the commonest symptom.

Perforative peritonitis was seen in 3 cases. 2 (67%) of them had perforated appendix and one (33%) was traumatic perforation of small bowel. In this group, 2 cases were in 5yr-12yr age group and 1 was in Preschool age group.(M:F=1:2). There were 3 cases of Malrotation.

2 were in 5yr -12 yr age group (67%) and 1 was in 1yr -5yr group with M: F ratio being 1:2. Of the 3 cases of Meckel's diverticulitis, 1 case each was from neonatal, 1yr-5yr and 5yr-12yr age group (33.33% each) (M:F=1:2). There were 3 cases of obstructed exomphalos. 2 cases were incarcerated Omphalocele Major and one was small defect obstructed Omphalocele Minor. 2 cases presented in neonates while one presented later in infancy.(M:F=1:2) All 3 cases of worm obstruction were females and there was one case each from infantile, 1yr-5yr and 5yr-12yr age group. All cases were managed conservatively. There were 2 cases of obstructed inguinal hernia (all Males) both were more than 5 yrs of age. Also, there was one case each of Meconium ileus and Meconium plug syndrome both presenting in neonatal age. Only one case (Female) was seen of Obstructed Umbilical Hernia.

Post operative complications: Postoperative complications were seen in 39% cases with some cases developing more than one complication. Wound infection (incidence 17%), wound dehiscence (incidence 9%), respiratory infection (8%) were more common than some others. Post operative fever was seen in 4% patients with Enterocutaneous fistula, anastomotic leak, colostomy prolapse, burst abdomen, renal failure and anorectal stenosis following anoplasty were all seen in 2% cases each. Anastomotic leak and enterocutaneous fistula were managed conservatively. One case of fistula expired due to septicemia.

OUTCOME

Mortality: The mortality in this study was 6%. There were two cases each of anorectal malformation and Necrotizing enterocolitis (33.33%) and one case each of jejunal atresia and obstructed inguinal hernia (16.7%) which did not survive. All of these cases had some complicating factors associated with them. The two cases of Anorectal malformation had Tracheoesophageal fistula and very low birth weight, case of jejunal atresia and two cases of necrotizing enterocolitis and inguinal hernia had either low birth weight or malnutrition along with septicemia.

CONCLUSIONS

Intestinal obstruction is a common surgical emergency in pediatric age group. Overall acquired causes of obstruction are more common than congenital ones except in neonatal age group where reverse trend is seen. Small bowel obstruction is more common than large bowel obstruction. Males are affected slightly more than females. Highest incidence of intestinal obstruction is seen in neonates followed by infants. Vomiting, constipation, abdominal distension, pain or excessive

crying and red jelly stools are common modes of presentation across all age groups. Intussusception is the most common cause of obstruction followed by anorectal malformation, Hirschsprung's disease, intestinal atresias, necrotizing enterocolitis, adhesive obstruction, malrotation, CHPS, worm obstruction and rare causes such as Meckel's diverticulitis, meconium ileus, meconium plug syndrome, obstructed exomphalos etc. In neonates, anorectal malformation is the most common cause of intestinal obstruction followed by intestinal atresias, necrotizing enterocolitis, Hirschsprung's disease, and rare causes like Meckel's diverticulitis, meconium ileus, meconium plug syndrome, obstructed exomphalos etc. The peak incidence of intussusception is seen in infants. It is rare in neonatal age group. Ileocolic type is the most common type followed by ileoileal with intussusception with pathologic lead points being rare in children. Post operative adhesive obstruction is more common in previously operated cases of appendicitis. Associated anomalies are commonly seen with congenital causes of obstruction like anorectal malformation, intestinal atresias and Hirschsprung's disease than acquired causes. The role of conservative treatment in pediatric intestinal obstruction is limited to mild variety of acquired causes of obstruction. In congenital causes, there is no role of conservative treatment. Consanguinity of parents marriage is a predisposing factor for congenital causes of intestinal obstruction. With better facilities of hospital care, better antibiotics and supportive care, availability of specialist in rural area overall mortality is on a wane in pediatric intestinal obstruction. However morbidity is still on higher side. Neonatal age is an important factor determining the mortality and overall outcome. Wound infection, wound dehiscence and respiratory infections are most common postoperative complications in pediatric age group with development of post operative complications directly affecting hospital stay (morbidity). Malnutrition and low birth weight in neonates significantly increases the hospital stay (morbidity). Also as malnutrition is more prevalent in lower socioeconomic strata of population, we can say that socioeconomic status of parents indirectly affects morbidity. Delay in presentation and delay in referral from primary health centers and general practitioners adversely affects the morbidity.

REFERENCE

1. Pujari AA, Methi RN, Khare N. Acute gastrointestinal emergencies requiring surgery in children. *Afr J Pediatric surg* 2008;5:61-64.
2. Ghritlaharey RK, Budhwani KS, Shrivastava DK, Exploratory laparotomy for acute intestinal conditions in children: a review of 10 yrs of experience with 334 cases: *Afr J pediatric surg*, 2011;8:62-69.

3. Sheikh KA, Baba AA, Ahmed SM, Shera Ah, Patnaik R, Sherwani AY; Mechanical small bowel obstruction in children at a tertiary care centre in Kashmir. *Afr J pediatr surg*;2010;7:81-85.
4. Gangopadhyay AN and Harshwardhan; Intestinal obstruction in children in India. *Pediatr surg Int J*;1989;4:84-87.
5. Ratan SK, Rattan KN *et al*; Surgically treated gastrointestinal obstruction in children: causes and complications. *Indian Journal of Gastroenterology*;2006;25:320-321.
6. C.A. Hajivassiliou Glasgow, Scotland, UK. Intestinal Obstruction in Neonatal/Pediatric Surgery ; *Seminars in Pediatric Surgery*, Vol 12, No 4 (November), 2003: pp 241-253.
7. Hussain Zahir, Sheikh KA, Lane R *et al*; Small bowel obstruction in children- A surgical challenge: *JK Practitioner* vol 13no.4 October - December 2006: 186-189.
8. Vijay Kumar, Anindya C *et al*; Adhesive Small Bowel Obstruction (ASBO) in Children – Role of Conservative Management. *Med J Malaysia* Vol 60 No 1 March 2005 81-84
9. Ameh EA, Chirdan LB. Neonatal intestinal obstruction in Zaria, Nigeria. *East Far Med J*2000. 77: 510-513.
10. Crankson SJ, Al-Rabeeh AA *et al*; Idiopathic intussusception in infancy and childhood. *Saudi med J* 2003; vol.24 Supplement 1: S18-S20.
11. National Family Health Survey NFHS 2 India 1998-1999.
12. Abubaker AM, Ofoegbu C.P.K: Factors affecting outcome of Emergency Pediatric abdominal surgery. *The Nigerian Journal Of Surgical Research* Volume 5 no.3-4. July-December 2003.
13. Saxena Ak *et al*. Factors influencing management and comparison of outcomes in pediatric intussusception. *Acta Pediatr* 2007;96:1199-1202.
14. Aviral, Chana RS, Ahmed I. Role of ultrasonography in evaluation of children with acute abdomen in emergency set-up. *J Indian Assoc Pediatr Surg* 2005;10:41-43.
15. Krishnakumar, Shahul Hameed and Umamaheshwari; Ultrasound Guided Hydrostatic Reduction in the Management of Intussusception. *Indian J Pediatr*, volume 73-March, 2006:217-220.
16. Mucha P Jr. Small intestinal obstruction. *Surgical clinics of North America* 47(3)1987. 597-620
17. Ogundoyin OO, Afolabi Ao, Ongulana DI, Lawal T, Yifeyeh Ac; Pattern and outcome of childhood intestinal obstruction at a tertiary hospital in Nigeria. *Afr Health Sci*. 2009 September;9(3) 170-173.
18. Belokar WK, Subrahmanyam M, Anant KS, Kolte R. PAEDIATRIC ACUTE INTESTINAL OBSTRUCTION IN CENTRAL INDIA. *Indian J Pediatr*;45;365:201-205;1978.
19. Ellis H. The spectrum of intestinal obstruction. *Br J Surg* 1987; 74:454-464.
20. Anningeri VM, Mahajan JK, Rao KLN. Etiological Spectrum of Acute Intestinal Obstruction; *Indian Pediatrics* Vol. 46, December 17, 2009; 1102-1103.
21. Ademuyiwa AO, Bode CO, Adesanya OA *et al*. Non trauma related pediatric abdominal surgical emergencies in Lagos, Nigeria: Epidemiology and indicators of survival; *Nigerian Medical Journal*; vol 52; issue2 april-june 2012:76-79.
22. Soomro BA, Kella N, Memon GA, Siddiqui MA. Pattern of intestinal obstruction in infants and children. *Pak J Med Sci* 2011;27(5):1009-1013
23. AHMADI, J., KALANTARI, M., NAHVI, H., ASHJAEI, B., EBRAHIM SOLTANI, A., JOODI, M., VALI-BALOOCH, M., MEHRABI. A survey of etiology of intestinal obstruction in a pediatric surgery center in Tehran. *Iranian Journal of Pediatrics*, Tehran, Iran, 15, Jun. 2005.
24. Hussain I, Akhtar J, Ahmed S, *et al*. Intestinal obstruction in infants and older children. *J Surg Pak* Mar 2002; 7(1): 2-6.
25. Archibong AE, Ndoma-Egba R, Asindi AA. Intestinal obstruction in southeastern Nigerian children. *East African Medical Journal* 1994, 71(5):286-289.
26. Adejuyigbe O, Abubakar AM, Sowande OA, Olayinka OS, Uba AF. Experience with anorectal malformation in Ile-Ife, Nigeria. *Pediatr Surg Int* 2004; 20(11-12): 855-8.
27. Klein MD, Philippart AI. Hirschsprung's disease : three decades experience at a single institution. *J Pediatr Surg* 1993; 28: 1291-4.
28. Stepanova EA, Krasovska ia TU, Muratou ID, Kobzeva TN, Golodenko NV, Vavilova TI. *Khirurgiia* 1994; 8 : 18-21.
29. Carneiro P.M.R and Kisiusi DM; Intussusception in children seen at Muhimbili National Hospital Dar Es Salaam. *East African Medical Journal* 2004;81:439-442.
30. Grosfeld JL. Intussusception Then and Now: A Historical Vignette. *J Am Coll Surg* 2005; 201: 830 -833.
31. Saha AK, Ali MB, Biswas SK *et al*. Neonatal Intestinal Obstruction: Patterns, Problem, Outcome. *Bang Med J (Khulna)* 2012; 45 : 6-10.
32. Uba AF, Edino ST, Yakubu AA, Sheshe AA. Childhood intestinal obstruction in Northwestern Nigeria. *West Afr J Med*. 2004 Oct-Dec;23(4):314-8.

Source of Support: None Declared
Conflict of Interest: None Declared