Neonatal Intestinal Obstruction-Four Year Experience

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ABSTRACT:

Aim of study: To study the aetiology and frequency, sex incidence, age of presentation, management and outcome of neonatal intestinal obstruction. **Material and Methods:** This prospective study of 316 neonates with intestinal obstruction was conducted over a period of 4 years from November 2009 to October 2013 at single institute. These cases were managed by various surgical procedures. Their epidemiology, day of presentation, associated anomalies and outcomes were studied. **Results:** A total of 316 neonates (277 males and 39 females) were operated for intestinal obstruction. 268(84.81%) neonates presented in the 1st week of life. Imperforate anus occurred in 206 (65.19%).Small bowel atresia accounted for23 (7.27%) cases while duodenal atresia was seen in19 (6.01%) patients. Infantile hypertrophic pyloric stenosis and Malrotation each occurred in 14 (4.43%) patients; Hirschsprung's disease in 18(5.69%), Necrotising Enterocolitis in 12(3.79%), Meconium disease of newborn in 9(2.85%) while colonic atresia was seen in one (0.3%) patient. Colostomy was performed in 145(45.88%), Pouchostomy in 15(4.74%) and Cutback anoplasty in 56(17.72%) patients. Ramsted's Pyloromyotomy in 13(4.11%)%) neonates, Laparoscopic Pyloromyotomy in 1(0.3%),Kimura's Duodenoduodenostomy in 19(6.01%) ,End to Back anastomosis in 24(7.59%) , End to End anastomosis in 7(2.21%) , Multiple anastomosis in 2(0.6%) , Enterotomy with irrigation in 7(2.21%) , Ladd's procedure in 14(4.43%) , ,Single stage transanal pull through in 8(2.53%) , Ileostomy in 2(0.6%) , Single stage Abdominoperineal pull through in 2(0.6%), Levelling colostomy in 6(1.89%) ,Peritoneal drain insertion under Local anaesthesia in 5(1.58%) . Overall mortality was 13.60%. **Conclusion**: Intestinal Obstruction is the most common surgical emergency in neonatal period. Early and accurate diagnosis is paramount for proper patient management. The etiology, mode of presentation, morbidity and outcome of surgery of intestinal obstruction in neonates in our study were not significantly different from other studies.
Key words: Intestinal obstruction, neonates.

Introduction:

Intestinal obstruction is one of the commonest diagnoses at admission in a neonatal surgical unit. 99% of healthy full-term neonates pass their first stool or meconium within 24 hours of birth, and all healthy term neonates should do so by 48 hours. With preterm neonates the length of time can extend up to 9 days.

Neonatal intestinal obstruction occurs in 1/1500 live births. Intestinal obstruction in the neonate may be due to a

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variety of conditions, including Imperforate anus atresia and stenosis, Infantile hypertrophic pyloric stenosis, annular pancreas, malrotation, duplication cyst, meconium ileus, meconium plug syndrome and neonatal small left colon syndrome, Hirschsprung disease, necrotising enterocolitis and other rarer causes. [1]

The mode of presentation can be acute, chronic or acute with systemic upset due to shock. Early diagnosis depends largely on the prompt detection of obstructive manifestations by the clinician, and the subsequent accurate interpretation of radiographic findings and other investigations. Definitive treatment should always be preceded by appropriate resuscitation and preparation of the neonate. Management of intestinal obstruction is almost always surgical, apart from some notable exceptions.

Intestinal Obstruction is most common surgical emergency in neonatal period. Early and accurate diagnosis is paramount for proper patient management. Major risk factor in any neonate with intestinal obstruction is the delay in diagnosis, electrolyte imbalance, hypovolemia, sepsis and presence of multiple anomalies.

However, associated multiple anomalies, particularly intracardiac anomalies are rarely diagnosed preoperatively, resulting in many unexplained anaesthetic complication and mortality.

In present study, an attempt has been made to study the epidemiology and management and outcome of intestinal obstruction in our institute.

Improvement in the surgical techniques and advances in neonatal anaesthesia along with improvement in postoperative care especially ideal intensive newborn care improves overall survival of these patients.

Material and methods:

This prospective study of 316neonates with intestinal obstruction was conducted over a period of 4 years from November 2009 to October 2013 in single institute. These cases were managed by various surgical procedures. Their epidemiology, day of presentation, associated anomalies and outcomes were studied.

All these neonates were diagnosed clinically and radiologically. The weight at presentation was between 1.4 to 3.6 kg while age at presentation ranged from 0 to 30 days.

After initial evaluation and proper resuscitation the presumptive diagnosis and decision regarding the need for surgery was based on clinical findings and examination of plain abdominal radiographs, ultrasound and barium study as and when required.

Tracheo-oesophageal fistula, Exomphalos and Gastroschisis were not included in this study and similarly those with imperforate anus who did not need stoma in neonatal period were also excluded.

All these neonates were surgically treated and different surgical procedures undertaken according to the type of pathology causing intestinal obstruction. These patients were managed post-operatively on the same lines regardless of the cause of obstruction and type of anomalies except infantile hypertrophic pyloric stenosis where breast feeding was started after 24 hours of surgery and neonates with stomas were also started breast feeding on functioning of stomas. TPN was administered to some of the patients with bowel anastomosis and prolonged ileus. The results of these patients were analyzed with respect to sex, gestational maturity, age at presentation, types of anomaly and the line of management.

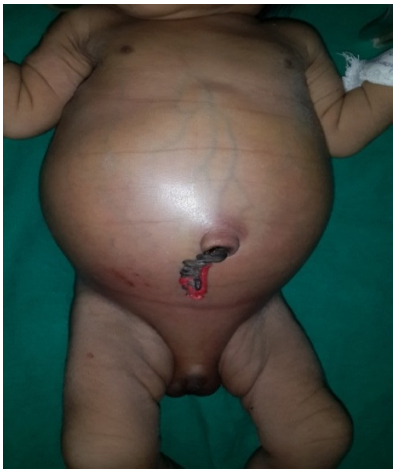

Image 1- Neonate presenting with Abdominal distension

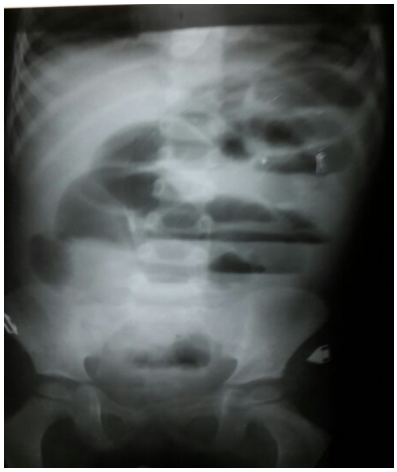

Image 2 -X ray Abdomen showing multiple air fluid levels s/o small bowel obstruction

Results:

Over a period of 4 years, 316 neonates were operated upon.

Sex: Out of the total 316 patients 277(87.65%) were male and 39(12.35%) were female with male to female ratio of 277/39 (7.10:1). The highest male to female ratio occurred in patients with imperforate anus, Hirschsprung's disease and Infantile hypertrophic pyloric stenosis. Small bowel atresia and Necrotising Enterocolitis was seen to be more or less equally distributed among the male and female patients i.e. 12:11 and 7:5. Duodenal atresia was seen as 12:7, Meconium disease 6:3, Malrotation 8:6 and colonic atresia was observed in single patient who was male.

Table-1 Sex incidence of different anomalies

Sr. No.	Disease	Sex		Total
		Male	Female	
1	Imperforate Anus	203	3	206
2	Infantile Hypertrophic Pyloric Stenosis	12	2	14
3	Duodenal Atresia	12	7	19
4	Small Bowel Atresia	12	11	23
5	Colonic Atresia	1	-	1
6	Hirschprung's disease	16	2	18
7	Malrotation	8	6	14
8	Necrotising Enterocolitis	7	5	12
9	Meconeum disease of newborn	6	3	9
	Total	277	39	316

Age at presentation: The average age of all neonates at presentation was 10 days. Majority of patients (84.81%) presented within first week of life, while only (15.19%) presented

after first week. The neonates who presented late after the first week of life included the patients with infantile hypertrophic pyloric stenosis (14), duodenal atresia (3), small bowel atresia (5), Hirschsprung's disease (6), Necrotising enterocolitis (7) and malrotation (11). The patients who presented earlier were imperforate anus, duodenal atresia, small bowel atresia, meconium disease of newborn and colonic atresia.

Table-2: Age of presentation

Sr. No.	Disease	Before 1st week	After 1st week	Total
1	Imperforate Anus	203	3	206
2	Infantile Hypertrophic Pyloric Stenosis	-	14	14
3	Duodenal Atresia	16	3	19
4	Small Bowel Atresia	19	4	23
5	Colonic Atresia	1	-	1
6	Hirschprung's disease	12	6	18
7	Malrotation	3	11	14
8	Necrotising Enterocolitis	5	7	12
9	Meconeum disease of newborn	9	-	9
	Total	268	48	316

Gestational maturity and birth weight: A total of 261(82.6%) patients were full term and 55(17.4%) were preterm. There were 66(20.88%) patients with low birth weight (<2.5kg). A high incidence of low birth weight was seen among the patients with small bowel and duodenal atresia.

Table-3 Incidence of low birth weight in different anomalies

Sr. No.	Disease	Below 2.5kg	Above2.5kg	Total
1	Imperforate Anus	32	174	206
2	Infantile Hypertrophic Pyloric Stenosis	3	11	14
3	Duodenal Atresia	8	11	19
4	Small Bowel Atresia	11	12	23
5	Colonic Atresia	-	1	1
6	Hirschprung's disease	3	15	18
7	Malrotation	8	11	19
8	Necrotising Enterocolitis	4	10	14
9	Meconeum disease of newborn	3	6	9
	Total	66(20.88%)	250(79.22%)	316

Types of anomaly: Imperforate anus was the most common cause of intestinal obstruction seen in 206(65.2%) cases. Small bowel atresia accounted for 23(7.27%) cases while duodenal atresia was seen in19 (6%) patients. Infantile hypertrophic pyloric stenosis and Malrotation each occurred in 14(4.43%) patients. Hirschsprung disease in 18(5.68%), Necrotising Enterocolitis in

12(3.8%), Meconium disease of newborn in 9(2.85%) while colonic atresia was seen in one (0.3%) patient.

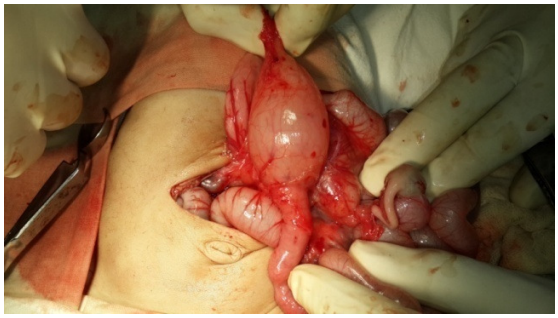

Image 3- Type 1 Duodenal Atresia

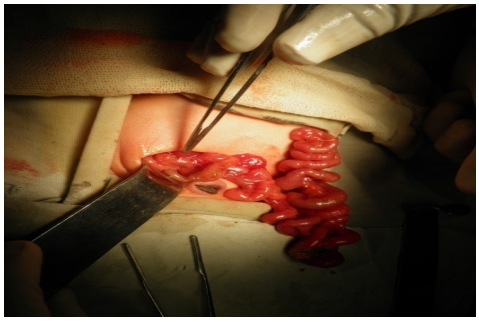

Image 4 – Intestinal Atresia type 3 b (apple peel atresia)

Surgery and mortality: All the neonates underwent for surgery in emergency after appropriate resuscitation and preparation. Colostomy was performed in 145(45.88%) patients out of which 103 were right transverse loop colostomies and 42 sigmoid loop colostomies. Pouchostomy was done in 15(4.74%) and Cutback anoplasty in 56(17.72%) patients. 9(4.36%) patients expired postoperatively due to associated Tracheo-oesophageal fistula and sepsis. Ramsted's Pyloromyotomy was done in 13(4.11%) neonates and Laparoscopic Pyloromyotomy in 1(0.3%). Kimura's Duodenoduodenostomy was performed in 19(6.01%) out of whom 5(26.31%) patients expired postoperatively. End to back anastomosis was performed in 21(6.64%) cases of small bowel atresia and in one (0.3%) case of colonic atresia. Multiple anastomoses were performed in 2(0.6%) cases of multiple small bowel atresia. Out of 23(6.96%) cases of small bowel atresia, 12(54.54%) patients expired postoperatively. In 7(2.21%) cases of necrotising enterocolitis with perforation peritonitis, end to end anastomosis was performed. Ileo-ascending anastomosis was performed in 4(1.26%) cases, and in remaining 3(0.95%) cases ileo-ileal end to end anastomosis was done and Drain insertion under local anaesthesia in 5(1.58%). Out of 12(3.79%) patients of necrotising enterocolitis 7(58.33%) expired postoperatively. Enterotomy with irrigation in 7(2.21%) and end to back anastomosis in 2(0.6%) cases of complicated meconium ileus. Out of 9(2.85%) cases of meconium disease of newborn 7(77.77%) expired postoperatively. Ladd's procedure was done in 14(4.43%) of whom only one (7.14%) patient died. For Hirschsprung's disease, Single stage transanal pull- through was done in 8(2.53%) patients, Ileostomy in 2(0.63%), Single stage Abdomino-perineal pull-through in 2(0.63%), Levelling colostomy in 6(1.89%). Delayed death occurred in 2(11.11%) patients of Hirschsprung's disease (one with ileostomy and one with levelling colostomy). Overall mortality was 43(13.60%).

Complications: The most common complication encountered in our series was sepsis, which was present in 33(10.44%) cases. Second most common complication was anastomotic leak which occurred in 14(4.43%) cases. Leak usually occurred on 4th post operative day. Ileus in 10(3.16%) cases, wound infection 5(1.58%) and burst abdomen in 3(0.95%) patients.

Table-4: Results of Surgery

Sr. No.	Disease	Survival	Mortality	Total
1	Imperforate Anus	197(95.64%)	9(4.36%)	206
2	Infantile Hypertrophic Pyloric Stenosis	14(100%)	Nil	14
3	Duodenal Atresia	14(73.69%)	5(26.31%)	19
4	Small Bowel Atresia	11(47.83%)	12(52.17%)	23
5	Colonic Atresia	1(100%)	Nil	1
6	Hirschprung's disease	16(88.89%)	2(11.11%)	18
7	Malrotation	13(92.86%)	1(7.14%)	14
8	Necrotising Enterocolitis	5(41.77%)	7(58.33%)	12
9	Meconeum disease of newborn	2(22.33%)	7(77.77%)	9
	Total	273(86.39%)	43(13.61%)	316

Discussion:

In our study the imperforate anus was the most common cause of intestinal obstruction in neonates. Small bowel atresia was second most common cause of intestinal obstruction. Colonic atresia was observed only in a single patient. Early presentation and early surgical intervention have an impact on the survival of these patients.[4,5] Gestational maturity and birth weight are important to be considered as prematurity and low birth weight is associated with raised mortality and prolonged morbidity in patients with neonatal intestinal obstruction.

The ratio of low birth weight is more in small bowel atresia (47.82%).The ratio of low birth weight babies in small bowel atresia in a study by Adeyemi is 34% [2] which is less than our study. The low birth weight ratio in this study associated with small bowel atresia is even more than that reported by Martin and Zerella 1976 which is 37 % .[6]

The result of surgery varied with the type of the disease. Infantile hypertrophic pyloric stenosis, imperforate anus, malrotation and Hirschsprung's disease showed better results with a survival rate of 100%, 95.64%, 92.86%, and 88.89% respectively. Small bowel atresia showed 47.83% survival rate. The results of small bowel atresia showing 47.83% survival are comparable with results of Adeyemi 1989 and Iliff 1990[2,3] who report 40% and 50% survival rates. Recently the survival rate of patients with small bowel atresia has been improved and is 90% as reported by Touloukian 1993.[5]

The survival rate for duodenal atresia, necrotising enterocolitis and meconium disease of newborn is 73.69%, 41.77%, and 22.33% respectively. The overall mortality shown in the study is 13.60%.

Conclusion:

Neonatal intestinal obstruction is one of the most common neonatal surgical emergencies. The etiology, mode of presentation, morbidity and outcome of surgery of intestinal obstruction in neonates in our study were not significantly different from other studies. The delay in presentation, metabolic disturbances, lack of ideal intensive care units and lack of availability of TPN were the major determinants of management outcome of neonatal intestinal obstruction in our study.

References:

1. Rescorla F J. Grosfeld J L. Intestinal atresia and stenosis. Analysis of survival in 120 cases. Surgery. 1985; 98:668.
2. Adeyemi D. Neonatal intestinal obstruction in developing tropical country. Pattern, problems and prognosis. J Trop pediatr. 1989; 35(2): 66.
3. Iliff PJ. Neonatal surgery in Harare Hospital. Cent Afr J Med. 1990; 36(1):11.
4. Smith G H. Glasson M. Intestinal atresia: factors affecting survival. Aust NZI surg.1989; 59(2): 151.
5. Touloukian RJ. Diagnosis treatment of Jejunoileal atresia World J Surg 1993; 17(3): 310.
6. Martin KW, Zerella J.T. Jejunoileal atresia. Proposed classification. J Pediatr Surgery 1976; 11: 399.
7. Rehman, F. Ullah, H. Ullah, K.et al. Neonatal Intestinal Obstruction: Factors affecting survival. Journal of Postgraduate Medical Institute, Peshawar-Pakistan, Aug.2011.
8. Osuramwense David Osifo, Jonathan Chukwunalu okolo et al. Neonatal intestinal obstruction in Benin, Nigeria. African Journal of Paediatric Surgery Oct 2009; 6: 98-101.
9. Rajiv Chadha et al. Management of jejunoileal and colonic atresia. J Indian Assoc Pediatr Surg. Apr-June 2006: Vol 11: Issue 2
10. Langer JC, Durrant AC, de la Torre L, Teitelbaum DH, Minkes RK, Caty MG, et al. One stage transanal Soave pullthrugh for Hirschsprung's disease: a multicenter experience with 141 children. Ann Surg.Oct 2003; 238(4):569-83; discussion 583-5.
11. A. Hadidi: Transanal endorectal pullthrough for Hirschsprung's disease: experience with 62 patients. J. Paed Surg. Vol.38 no.91, sept: 1337-40, 2003.
12. Ali KAE. Transanal endorectal pull- through for Hirschsprung's disease during the first month of life. Ann Pediatr surg.2010; 6:81-8.
13. Ismail A. One stage pull-through for Hirschsprung's disease. Qutar Med J.2000; 9:18-21.
14. Hassan HS. One stage transanal endorectal pull-through procedure for Hirschsprung's disease in neonates. Ann Pediatr Surg.2009; 5:21-26.
15. Hollwarth ME, Rivosecchi M. The role of transanal pull-through in the treatment of Hirschsprung's disease: A multicenter experience. Pediatr Surg Int.2002; 18:344-8.
16. Davenport M, Bianchi A, Diog CM, Gough DC. Colonic atresia: current results of treatment. J R Coll Surg Edinb. Feb 1990; 35(1):25-28.
17. Donnison A.B Shwachman H Gross R.E.: A review of 164 children with meconium ileus seen at the children's Hospital Medical Center, Boston. Pediatrics 1966; 37:1-18.
18. Schober P. H. Nassiri J.: Risk factors and severity indices in necrotising enterocolitis. Acta Paediatr Suppl 1994; 396: 49-52.
19. Ein SH, Marshall DG, Girvan D. Peritoneal drainage under local anaesthesia for perforations from necrotising enterocolitis. J Pediatr Surg. Dec 1977; 12(6); 963-7.
20. Moss RL, Dimmitt RA, Barnhart DC, Sylvester KG, Brown RL, Powell DM, et al. Laparostomy versus peritoneal drainage for necrotising enterocolitis and perforation. N Engl J Med. May 25 2006; 354(21):2225-34.