

SMALL GUT ATRESIA IN NEONATES

Arshad Kamal, Kifayat Khan, Inayat ur Rahman*, Ayub Khan

Department of Paediatric Surgery, Lady Reading Hospital,*Khyber Teaching Hospital, Peshawar, Pakistan

Background: Small gut atresia is a common neonatal surgical problem. Early diagnosis and timely management of the neonate can reduce mortality and morbidity in these patients. The aim of this study was to note the causes of mortality and morbidity in these neonates. **Methods:** This was a prospective study conducted at Lady Reading Hospital (LRH) Peshawar from August 2007 to August 2009. All patients with small gut atresia were included in this study. Neonates having intestinal obstruction due to another cause were excluded from this study. The diagnosis of small gut atresia was usually established peroperatively as other causes of intestinal obstruction like meconium ileus or meconium plug syndrome etc. in neonatal period mimic small gut atresia. **Results:** A total of 40 neonates with small gut Atresia were included in this study. Among them 28 were males and 12 were females. Age of presentation ranged from 1 to 8 days. Weight of the neonates ranged from 1.8–2.8 Kg with the mean weight of 2.43 Kg. Peroperatively type-III(a) Atresia was the commonest type 20 (50%). Resection and end to end anastomosis was done in 31 cases. Nine neonates needed ileostomy. Financial constraints, late presentation, aspiration, sepsis, gut perforation and gangrene were the main contributors to death of these neonates. **Conclusion:** Neonates having small gut atresia should be treated at a centre equipped for dealing neonates during all stages of management.

Keywords: Small gut atresia, Management, Neonate

INTRODUCTION

Atresia means complete obstruction of intestinal lumen due to certain intrauterine vascular catastrophe.¹ Intestinal atresia causes irreversible complications which are poorly tolerated by neonates.² Early presentation, prompt diagnosis and appropriate treatment have improved outcome in these patients.³ In developing countries late presentation of a clinically compromised neonate is rampant. Lack of basic facilities for proper management of neonates, poor socioeconomic status of parents and sex discrimination contribute to the mortality and morbidity of these neonates.^{4,5} Another contributing factor to the mortality in these neonates is the status of emergency operation theatre and lack of proper neonatal anaesthesia personal and equipment.⁶ Associated congenital anomalies result in unexplained anaesthesia complications and mortality.⁷

The aetiology, presentation, morbidity and outcome of treatment varies significantly at different centres around the world.^{8,11} In this prospective study, we present our experience with patients having small gut atresia at Lady Reading Hospital Peshawar and to study the causes of mortality and morbidity in these neonates.

MATERIAL AND METHODS

This prospective study of neonatal small gut atresia was conducted at Department of Paediatric Surgery, Lady Reading Hospital, Peshawar from August 2007 to August 2009. Data was collected on a prescribed proforma and analysed for age, sex, weight, presentation, treatment and outcome. Patients suspected to have small gut atresia were admitted to ward on

presentation as emergency, or from outpatient department. All the neonates underwent X-ray erect abdomen and ultrasound abdomen. A nasogastric tube was passed, per rectal examination was done in all cases. Neonates were put on intravenous antibiotics and fluids. Exploration was done after the baby was properly prepared for surgery. Most of the explorations were done in casualty operation theatre. Any neonate having preoperative diagnosis other than small gut atresia were excluded from this study. Postoperatively patients remained nil by mouth until bowel sounds returned, abdominal distension relieved and nasogastric tube aspirate diminished. After this period the neonates were orally allowed and observed for 24 hours. These neonates were followed up at outpatient department for a period of 3 months.

RESULTS

There were a total of 40 cases of neonatal small gut atresia in this study. Among them 28 (70%) were male and 12 (30%) were female. The age ranged from 2 to 8 days with the average age being 4.5 days. The average weight of these neonates was 2.43 Kg.

Clinical presentation included bilious vomiting in 40 (100%), Abdominal distension in 30 (75%), Failure to pass meconium in 33 (88%) and jaundice in 5 (12.5%) cases.

Eight (20%) neonates presented to us after 1 week of birth. This delay resulted in sepsis, fluid and electrolyte derangement, nutritional problems and respiratory complications. In 10 (25%) children the obstruction was complicated by gut perforation.

Diagnosis was made by combination of clinical and radiological basis. The classical picture of multiple air fluid levels and absence of gas in large gut

observed in the erect abdominal X-Ray was present in 40 (100%) neonates having small gut atresia. The exact site and type of Atresia and whether accompanied by malrotation or not was diagnosed intraoperatively.

Small gut atresia was classified on the basis of classification done by Grossfeld. In our study 5 (12.5%) neonates had type-I atresia, 4 (10%) had type-II atresia, 20 (50%) had type III(a) atresia, 7 (17.5%) had type-III (b) atresia and 4 (20%) had type-IV atresia. In our study type III(a) atresia was the commonest, i.e., 20 out of 40 cases which is in accordance to the studies done by Smith, Glosson and Grosfeld. Postoperative complications included septicaemia in 7 (17.5%), Aspiration pneumonia in 6 (15%), Hypothermia in 4 (10%), IV line sepsis in 40 (100%), Wound infection in 10 (25%) and anastomotic leak in 1 (2.5%) cases.

There were a total of 17 (42.5%) deaths during our study. In our study the mortality rate is higher than the other studies. The contributors to the mortality of the neonates in our study were septicaemia, aspiration pneumonia and hypothermia.

Table-1: Clinical presentation of neonates with small gut atresia

Presenting sign	Number (%)
Bilious vomiting	40 (100%)
Abdominal Distension	30 (75%)
Failure to pass meconium	33 (88%)
Jaundice	5 (12.5%)

Table-2: Operative findings of type of atresia

Type of atresia	Number (%)
Type I	5 (25%)
Type II	4 (10%)
Type III(a)	20 (50%)
Type III(b)	7 (17.5%)
Type IV	4 (10%)

Table-3: Causes of death in patients with jejunoileal atresia

Cause of death	Number of patients
Septicaemia	7
Aspiration pneumonia	6
Hypothermia	4

Table-4: Post operative complications

complication	Number (%)
Delayed bowel function	5 (12.5%)
Intravenous line sepsis	40 (100%)
Wound infection	3 (7.5%)
Anastomotic leak	1 (2.5%)
Re exploration	1 (2.5%)

DISCUSSION

In this study, we had a total of 40 neonates with small gut atresia. Twenty-eight neonates were males while 12 were females. Jejunal atresia was common in females, i.e., 8 out of 12 female neonates had jejuna atresia. Nearly 1/3rd neonates in this study had weight below 2.5 Kg. Polyhydromnios was observed in 20 (50%) mothers of neonates with small gut atresia.⁸⁻¹⁰ The cause of atresia such as abdominal wall defects,

internal herniation and malrotation of gut was found in 4 (10%) cases.^{12,24-26}

The clinical signs of small gut atresia were more pronounced in our study as compared to other studies done by Grosfeld and Rescorla. Abdominal distension was noted in 30 (75%) cases, Bilious vomiting was present in 40 (100%) cases while failure to pass meconium was observed in 35 (88%) cases. The clinical signs were exaggerated in our study because most of the neonates presented to us late, i.e., after 3rd day of life. Aspiration during vomiting, splitting of diaphragm due to abdominal distension and high propensity to sepsis were the factors which had negative impact on the outcome of neonatal small gut atresia.^{11,13,14}

Intestinal perforation and gangrene with resultant peritonitis were associated with severe preoperative morbidity and postoperative complications such as wound infection,^{15,16} burst abdomen and a high mortality rate¹⁷.

These patients required mandatory emergency surgery at casualty operation theatre. Unfortunately, in an environment which lacks facilities needed to operate and handle postoperative problems of such neonates resulting in high mortality rates in these neonates.¹⁸⁻²¹ The emergency operation theatre at casualty department is shared by general surgery, paediatric surgery, orthopaedic surgery, neurosurgery and cardiovascular surgical departments. Most of the time there is no operation table available, so the neonates have to wait for their turn in the waiting area. During cold season these patients usually develop hypothermia due to the harsh condition of the waiting area. The other major cause of delay is the frequent occurrence of bomb blasts in Peshawar. As most of the victims of bomb blast injuries are brought to and treated at Casualty Department, Lady Reading Hospital Peshawar, so these cases are postponed due to the heavy load of bomb blast injured patients.

The anaesthesia staff at casualty department is not properly trained in dealing with neonatal surgery. The surgical instruments available are not up to the mark and due to the heavy work load the standard of sterilisation is low. The factors mentioned above contribute heavily to the mortality and morbidity of these neonates in their preoperative and operative period. During their post operative stay these patients are kept and treated in neonatal chamber of paediatric surgery ward. Due to the heavy work load and cross infection from other patients cause increase in the mortality and morbidity of these neonates. They are kept in paediatric surgical unit because there is no neonatal intensive care unit in LRH, Peshawar. Female patients suffered most because of gender discrimination. Most of female neonates were presented late and parental motivation was very low in case of female

neonate. The presence of other associated congenital anomalies increased mortality rate in these patients.^{22,23}

In our study 25 neonates were operated at casualty operation theatre out of which only 8 (30%) survived, while 17 (70%) of these babies expired. Fifteen neonates were operated at elective list and all of them survived. The major causes of death were septicaemia, aspiration pneumonia and hypothermia (Table-3). During their postoperative stay at paediatric surgery unit these neonates had some complications like delayed bowel function, intravenous line sepsis, wound infection, anastomotic leak, hypothermia, malnutrition and re-exploration, (Table-4).

The clinical signs in our study were more obvious than the previous studies done by Touloukian, Rescorla, Grossfeld, Sameul and Gormal, due to the fact that neonates presented to us late. Neonates with multiple anomalies, atresia complicated by severe abdominal distension, aspiration, sepsis, gut perforation and bowel gangrene had poor outcome. Late presentation, financial constraints, and poor parenteral motivation especially in female neonates were the major determinants of management outcome of neonatal small gut atresia.

CONCLUSION

Small gut atresia is a common congenital anomaly which has better surgical results if the baby is referred to a tertiary care hospital early. Late presentation results in increased mortality and morbidity. Tertiary care hospitals should be properly equipped to deal these neonates during their preoperative, operative and post operative phases.

REFERENCES

1. Adeniran JO, Odebo TO. Congenital malformations in pediatric and neurosurgical practice: Problems and pattern (A preliminary report) *Sahel Med J* 2005;8:4-8.
2. Goulet O, Baglin-Gobet S, Talbote C, Fourcade L, Colomg V, Sauvatss F. Outcome and long term growth of extensive small bowel resection in neonatal period. A survey of 87 children. *Eur J Pediatr Surg* 2005;15:95-101.
3. Couper ID, Thurley JD, Hugo JF. The neonatal resuscitation training project in rural South Africa. *Rural Remote Health* 2005;5:459-63.
4. Sowande OA, Ogundoyo OO, Adeguyingbe O. Pattern and factors affecting management outcome of neonatal emergency surgery in Ile-Ife, Nigeria. *Surg Pract* 2007;11:71-5.
5. Osifo OD, Oriafio IA. Factors affecting the management and outcome of neonatal surgery in Benin City, Nigeria. *Eur J Paediatr Surg* 2008;18:107-10.
6. Faponle AF, Sowonde OA, Adejuyingbe O. Anaesthesia for neonatal surgical emergencies in a semi urban hospital in Nigeria. *East Afr Med J* 2004;81:568-73.
7. Ameh EA, Ameh N. Providing safe surgery for neonates in sub Saharan Africa. *Trop Doct* 2003;33:145-7.

8. Aidlen J, Anupindi SA, Jaramillo D, Doody DP. Malrotation with midgut volvulus: CT findings of bowel infarction. *Paediatr Radiol* 2005;35:529-31.
9. Sweeney B, Surana R, Puri P. Jejunoileal atresia and associated malformations. Correlation with the timing of in utero insult. *J Paediatr Surg* 2006;36:774-6.
10. Rottgen R, Ocran K, Lochs H, Hannm B. Cinematographic techniques in diagnostics of intestinal diseases using MRI enteroclysis. *Clin Imaging* 2009;33(1):25-32.
11. Piper HG, Alesbury J, Waterford SD, Zurakowski D, Jaksic T. Intestinal atresia: Factors affecting clinical outcomes. *J Paediatr Surg* 2008;43(7):1294-8.
12. Walker GM, Raine PA. Bilious vomiting in new born: How often is further investigation undertaken? *J Paediatr Surg* 2007;42:714-6.
13. Walker GM, Neilson A, Young D, Raina PA. Colour of bile vomiting in intestinal obstruction in new born questionnaire study. *BMJ* 2006;332:1363.
14. Aslenabadi S, Ghalehgholab-Behbahani A, Jamshidi M, Veisi P, Iran SZ. Intestinal malrotations: A review and report of 30 cases. *Folia Morphol (Warsz)* 2007;66:227-82.
15. Grant HW, Parker MC, Wilson MS, Menzies D, Sunderland G, Thompson JN, *et al.* Adhesions after abdominal surgery in children. *J Paediatr Surg* 2008;43:152-6; discussion 156-7.
16. Young JY, Kim DS, Muratore CS, Kurkchubasche AG, Tracy TF Jr, Luks FJ. High incidence of post operative bowel obstruction in newborns and infants. *J Paediatr Surg* 2007;42:962-5.
17. Desilva NT, Young SA, Wales PW. Understanding neonatal bowel obstruction building knowledge to advance practice. *Neonatal Netw* 2006;25(5):303-18.
18. Shau SL, Su BH, Lin KJ, Lin H C, Lin JN. Possible effect of probiotics and breast milk in short bowel syndrome: report of one case. *Acta Paediatr Taiwan* 2007;48(2):89-92.
19. Lin CH, Wu SF, Lin WC, Chen AC. Meckel's diverticulum induced intrauterine intussusception associated with ileal atresia complicated by meconium peritonitis. *J Formos Med Assoc* 2007;106:495-8.
20. Chaudhory MS, Grant HW. Small bowel obstruction due to adhesions following neonatal laparotomy. *Pediatr Surg Int* 2006;22:729-32.
21. Rygl M, Skaba R, Lisy J, Pycha K. Acute gastrointestinal obstruction as a late presentation of congenital diaphragmatic hernia. A report of 3 cases. *Acta Chir Belg* 2006;106:430-2.
22. Haiden N, Jilma B, Gerhold B, Klebermass K, Prusa AR, Kuhle S, *et al.* Small volume enemas do not accelerate meconium evacuation in very low birth weight infants. *J Paediatr Gastroenterol Nutr* 2007;44(2):270-3.
23. Shinohara T, Tsuda M, Koyama N. Management of meconium-related ileus in very low birth weight infants. *Pediatr Int* 2007;49:641-4.
24. Hirata T, Iwaler M, Nagasaka M, Katada K. X-ray examination of small intestine —conventional enteroclysis and CT enterography. *Nippon Rinsho* 2008;66:1259-67.
25. Borsellino A, Zaccara A, Nahom A, Trucchi A, Aite L, Giorlandino C, *et al.* False-positive rate in prenatal diagnosis of surgical anomalies. *J Paediatr Surg* 2006;41:826-9.
26. Cassart M, Masseur A, Lingier P, Absil AS, Donner C, Avni F. Sonographic prenatal diagnosis of malpositioned stomach as a feature of uncomplicated intestinal malrotation. *Paediatr Radiol* 2006;36(4):358-60.
27. Pratap A, Kaur N, Shakya VC, Sapkota G, Tanveer-ur Rahman S, Biswas BK, *et al.* Triple tube therapy: a novel enteral feeding technique for short bowel syndrome in low-income countries. *J Paediatr Surg* 2007;42:470-3.

Address for Correspondence:

Dr. Arshad Kamal, District Paediatric Surgeon, Mardan Medical Complex, Mardan, Pakistan. **Tel:** +92-91 6281582, +92-91-6281095. **Cell:** +92-346-9028747.

Email: arshad_kamal007@yahoo.com