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Clinical Profile and Outcome in Distal Gastrointestinal Tract Obstruction in Neonates with Special Emphasis on Role of Colostomy and its Complications

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Abstract

Background: Unlike adults or older children, the intestinal obstruction in neonates in majority of the cases is due to congenital anomalies. The mode of presentation can be acute, with obvious features of obstruction or presentation can also be more subtle and chronic in cases of incomplete or recurring and resolving bouts of obstruction.

Aims and objectives: To determine the various causes, clinical presentation, type of surgical intervention, various types of colostomies, outcome (morbidity and mortality) of neonatal distal intestinal obstruction.

Material and methods: This prospective study was conducted in the Department of Paediatric surgery of our hospital over a period of 2 years (between July 2013 to June 2015) and included all the neonates (age limit of 0 days to 1 month) presenting as lower gastrointestinal tract obstruction. Detailed history, clinical examination, investigations followed by proper surgical intervention if needed was carried out.

Results: Of the total of 170 patients, 117(68.82%) were males and 53 (31.18%) were females with major chunk of babies born in health care facilities, 93 (54.71%), however still a good number of babies were born at home as well, 77 (45.29%).58(34.1%) patients were low birth weight (<2.5 kg) at birth whereas rest of the babies, 112(65.9%) were >2.5 kg. In relation to gestational age, 39 (22.94%) babies were preterm, 115 (67.64) babies were full term and 16 (9.41%) babies were post term. The presenting features varied significantly with abdominal distension (77.06%), failure to pass meconium (77.64%), vomiting and fluid and electrolyte disturbances being present in most of the patients. A total of 22 patients died with a mortality of 14.10%. It was higher in low birth weight neonates and in babies with co-morbidities (severe congenital anomalies, hypothermia, and severe respiratory embarrassment) and post-operative complications (bleeding diathesis, sepsis).

Conclusions: Neonatal intestinal obstruction is one of the most common paediatric surgical emergencies presenting to our centre and every effort must be made to identify this entity as early as possible so as to address it at the earliest to minimize the morbidity and mortality associated with it.

Keywords: Neonate; Gastrointestinal tract; Obstruction

Introduction

Unlike adults or older children, the intestinal obstruction in neonates in majority of the cases is due to congenital anomalies. Intestinal obstruction in the newborn may be due to a variety of conditions, including intestinal atresia and stenosis, annular pancreas, malrotation, duplication cyst, meconium ileus, meconium plug syndrome and neonatal small left colon syndrome, Hirschsprung's disease, neoplasia, trauma, and other rarer causes [1].

The mode of presentation can be acute, with obvious features of obstruction (vomiting, which will invariably become bile-stained); constipation with or without features of peritonism and perforation; and severe systemic upset due to shock. The presentation can also be more subtle and chronic in cases of incomplete or recurring/resolving bouts of obstruction [2].

Neonates with unrecognized intestinal obstruction deteriorate rapidly; show an increase in associated morbidity and mortality, and appropriate surgical treatment becomes more hazardous. 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, leading to definitive treatment (usually surgical), which should always be preceded by appropriate resuscitation/preparation of the neonate [1,2]. Conservative management has a much lower chance of success in acute cases and cannot be advocated generally [3].

Material and Methods

This prospective study was conducted in the Department of Paediatric surgery Sher-I-Kashmir Institute of Medical Sciences (SKIMS) over a period of 2 years (between July2013 to June 2015) and includes all the neonates (age limit of 0 days to 1 month) presenting to the department of Paediatric surgery, SKIMS as lower gastrointestinal obstruction over this period.

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Inclusion criteria: All neonates presenting with features of distal gastrointestinal tract (GIT) obstruction (abdominal distension, failure to pass meconium, vomiting and other associated features).

Exclusion criteria: Neonates with upper GIT obstruction and those dying before or during intervention were excluded from the study.

Detailed clinical history of the patient was taken, as narrated by the nearest relative available (including patient's bio data, antenatal history, age of presentation, birth weight, place of delivery, distance from hospital, pre-transportation resuscitation measures, presenting features etc.). Patients were then subjected to a detailed clinical examination and appropriate investigations which include haemogram, kidney function tests, and blood cross match, erect X-ray abdomen and ultrasound abdomen. Specific investigations like, upper GI contrast study, contrast enema, rectal biopsy, stool for occult blood etc. were carried out when indicated.

All patients were be subjected to a pre-surgical resuscitation programme which included intravenous fluids (in the form of D10%, N/4 or N/5 in D5% as per the requirement), oxygen administration, intravenous antibiotics, gastric decompression (in the form of NG aspiration). After the preliminary work up and resuscitation, patients in whom operative management was indicated were operated upon. The type of anomaly, operative findings and operation performed were recorded.

Post operatively, the patients were monitored till the time of discharge from the hospital and post-operative complications noted. After the discharge from the hospital the patients were followed up regularly in the outpatient department (OPD). All the patients were on follow up for a minimum of 3 months and data was collected in terms of post-operative complications, morbidity and mortality. Also, all patients were studied for the indications of colostomies, type of colostomy, site of colostomy and the complications of the colostomy.

The data was analysed using Microsoft Excel and SPSS19 (Statistical Package for Social Sciences) software, and the results of colostomies were analysed using Chi square test.

Results

The study included the clinical profile of 170 neonates who presented as lower gut obstruction over a period of two years (July 2013 to June 2015)out of which, 97 (57%) patients presented in the first week of birth, followed by 49 (28.82%), 14 (8.24%) and 10 (5.88%) patients in second, third and fourth week respectively. The lower gut obstruction in our series was maximum in patients born at birth order 2, at 78 (45.88%), followed by first, third and fifth birth order having 48(28.2%), 32(18.8%), 10(5.9%), and 2(1.18%) patients respectively. Of the total of 170 patients, 117(68.82%) were males and 53 (31.18%) were females with major chunk of babies born in health care facilities, 93 (54.71%), however still a good number of babies were born at home as well, 77 (45.29%).58(34.1%) patients were low birth weight (<2.5 kg) at birth whereas rest of the babies, 112(65.9%) were >2.5 kg. In relation to gestational age, 39 (22.94%) babies were preterm, 115 (67.64) babies were full term and 16 (9.41%) babies were post term.

The presenting features varied significantly with abdominal distension (77.06%), failure to pass meconium (77.64%), vomiting and fluid and electrolyte disturbances being present in most of the patients as shown in Table 1. The type of lower gut obstruction, as determined at the time of surgery, were anorectal malformation (ARM) (49.41%), followed by Hirshprung's disease (24.12%) followed by the rest as showm in Table 2. The operative procedures done were as per the intra operative findings. Colostomy, either a loop or an end, in 70 babies, anoplasty in 45 babies in addition to other procedures as dictated by the intra operative findings. Rectal biopsy was taken in 51 patients (41 Hirschsprung's disease, 1 total colonic aganglionosis, 9 ARM) as depicted in Table 3.

The congenital anomalies were present in 29 patients, leading type being Down's syndrome (8 patients), multiple anomalies (7 patients), bladder and renal anomalies (5 patients), cardiac anamolies (4 patients), Cleft palate (3 patients) and Trachea- oesophageal fistula (2 patients).

A total of 14 patients were lost to follow up (including 6 patients with colostomies). Post-operative complications were seen in 28 patients (17.95%), mostly as surgical site infection, sepsis and anastomotic leaks. Complications were found to be higher in pre-term low birth weight babies. Colostomy related complications were presented in 17 of these patients and included stomal prolapse, para-stomal skin excoriation etc. 15 patients were found to have more than one complication as shown in Table 4.

Of the patients who were available for follow up (156), a total of 22 patients died with a mortality of 14.10%. It was higher in low birth weight neonates and in babies with co-morbidities (severe congenital anomalies, hypothermia, and severe respiratory embarrassment) and post-operative complications (bleeding diathesis, sepsis).

A total of 70 colostomies were performed; mostly for Hirschsprung's disease 41, (58.57%) which included 25 males and 16 females. A reminder of 29(41.5%) colostomies was performed in patients of ARM

Presentation		Number (%)
Vomiting		89 (52.35)
Failure to pass meconium		132 (77.64)
Abdominal distension	With skin changes	7 (4.12)
	Without skin changes	124 (72.94)
Absent / stenosed anal orifice		55 (32.35)
Respiratory embarrassment		63 (37.06)
Hypothermia		45 (26.47)
Fever		26 (15.29)
Cyanosis		15 (8.82)
Jaundice		38 (22.35)
Fluid/ electrolyte derangements		96 (56.47)
Congenital anomalies		29 (17.06)

Table 1: Clinical presentation.

Cause of obstruction	Number (%)
Intestinal atresia Type 1	8 (4.7; 38.09)
Intestinal atresia Type 2	5 (2.9; 23.81)
Intestinal atresia Type 3	7 (4.12; 32.33)
Intestinal atresia Type 4	1 (0.01; 4.76)
ARM (High)	29 (17.06; 34.52)
ARM (Low)	55 (32.35; 65.48)
Hirschsprung's disease	41 (24.12)
Volvulus (without gangrene)	7 (4.12; 70.0)
Volvulus (with gangrene)	3 (1.76; 30.0)
Meconium plug syndrome	4 (2.35)
Meconium peritonitis	7 (4.12)
Necrotizing enterocolitis	2 (1.18)
Total colonic aganglionosis	1 (0.01)
Total	170

Table 2: Cause of obstruction.

Operative procedure	Number (%)
Transverse colostomy	34 (20.0; 48.57)
Sigmoid colostomy	29 (17.06; 41.43)
Descending colostomy	7 (4.12; 10.0)
Resection anastomosis	21 (12.35)
Resection anastomosis with ileostomy	6 (3.51)
Resection with ileostomy	2 (1.18)
Anoplasty	45 (26.47; 84.91)
Anal dilatation	8 (4.71; 15.09)
Ladd procedure	5 (2.94)
Pr. closure of perforation with peritoneal lavage	3 (1.76)
Ileostomy with peritoneal lavage	4 (2.35)
Bishop Koop's procedure	1 (0.01)
Conservative management	5 (2.94)
Total	170

Table 3: Operative procedures.

Post op complications	Number (%)
Surgical site infection	15 (9.62)
Wound dehiscence	5 (3.21)
Sepsis	7 (4.49)
Anastomotic leak	6 (3.85)
Anastomotic stenosis	2 (1.28)
Anal stenosis	6 (3.85)
Paralytic ileus	5 (3.21)
Entero-cutaneous fistula	2 (1.28)
Stomal prolapsed	7 (4.49)
Stomal stenosis	5 (3.21)
Stomal retraction	3 (1.92)
Stomal oedema / obstruction	6 (3.85)
Stomal strangulation / necrosis	1 (0.64)
Skin excoriation	7 (4.49)
Para stomal hernias	4 (2.56)
Adhesion obstruction	10 (6.41)
Bleeding diathesis	11 (7.05)
UTI	13 (8.33)
Colostomy diarrhoea	7 (4.49)

Table 4: Post operative complications.

which included 18 males and 11 females. Loop transverse colostomy was performed in most of the patients (21 patients), followed by divided sigmoid colostomy (17 patients) as shown in Table 5. Complications after colostomy formation were noted in 15 patients (transverse loop 6; transverse divided 3; sigmoid loop 2; sigmoid divided 2; descending loop 1; descending divided 1), total number of complications being 54 (transverse loop 22; transverse divided 9; sigmoid loop 3; sigmoid divided 10; descending loop 5; descending divided 5). Multiple complications were seen in 10 patients after colostomy formation. Complications after colostomy formation were noted in 15 patients (transverse 9, 26.47%; sigmoid 4, 13.79%; descending 2, 28.5%), total number of complications being 54 (transverse 31; sigmoid 13; descending 10) as shown in Table 6. Colostomy closure was done in 64 patients (91.42%), while 6 patients were lost to follow up. Complications after colostomy closure were noted in 9 patients (transverse loop 2; transverse divided 2; sigmoid loop 1; sigmoid divided 1; descending loop 1; descending divided 2), total number of complications being 17 (transverse loop 5; transverse divided 2; sigmoid loop 1; sigmoid divided 1; descending loop 4; descending divided 4). Multiple complications were seen in 3 patients after colostomy take down.

Complications after colostomy closure were noted in 9 patients (transverse 4, 12.5%; sigmoid 2, 7.4%; descending 3, 60.0%), total number of complications being 17 (transverse 7; sigmoid 2; descending 8) as shown in Table 7. Transverse colostomy had a total of 38 complications (formation 31, take down 7), sigmoid colostomy15 (formation 13, take down 2) and descending colostomy had a total 18 (formation 10, take down 8) complications.

Discussion

Although in the developed world, with the advent of highly specialized neonatal intensive care and a high level of multi-disciplinary approach, the outlook of the neonatal lower gut obstruction has improved dramatically, it still continues to be a major challenge for the paediatric surgery units in our part of the world.

The age group ranged between 4 hours to 28 days (mean, 6.3+/-1.7 days) which is comparable to that reported by Oludayo et al. [4] (mean 6.62+/_7.14 days), Ameh et al. [5] (5 hours to 28 days) and Osarumwense et al. [6] (7.9+/_2.9 days). Most of the neonates presented in the first week of life (57.14%) which is comparable to that reported by Oludayo et al. [4] and Osarumwense et al. [6]. In our study, most of the neonates with lower gut obstruction had a birth order 2 (45.88%), followed by 1 (28.23%), 3 (18.82%), 4 (5.88%) and 5 (1.18%). This is comparable to that reported by Osarumwense et al. [6] (birth order 2, 53.57%) and Ogundoyin et al. [7] birth order 2, 44.5%).

ARM was the most common cause of obstruction in our series (49.41%), followed by Hirschsprung's disease (24.12%), intestinal atresia (12.35%), volvulus (5.88%), meconium peritonitis (4.12%),

Site and type of stoma		ARM (n=29)	Hirschprung's disease (n=41)
Transverse colostomy	Loop (n=21)	5 (23.81)	16 (76.19)
	Divided (n=13)	9 (69.23)	4 (30.77)
Sigmoid colostomy	Loop (n=12)	2 (16.67)	10 (83.33)
	Divided (n=17)	11 (64.71)	6 (35.29)
Descending colostomy	Loop (n=4)	1 (25.0)	3 (75.0)
	Divided (n=3)	1 (33.33)	2 (66.66)

Table 5: Various types of colostomies.

Complication	Transverse colostomy (n=34)	Sigmoid colostomy (n=29)	Descending colostomy (n=7)	P value	Comments
Prolapse	4	2	1	0.02	S
Stenosis	3	2	1	0.7	NS
Retraction	1	1	1	0.2	NS
Skin excoriation	5	2	0	0.02	S
Diarrhoea	5	1	1	0.4	NS
Para stomal hernia	2	1	1	1.0	NS
Para stomal edema/ obstruction	4	1	1	0.3	NS
Urinary tract infection	3	2	2	0.2	NS
Bleeding	4	1	2	0.004	S

NS: not significant, S: significant

Table 6: Complications after colostomy formation.

Complication	Transverse colostomy (n=32)	Sigmoid colostomy (n=27)	Descending colostomy (n=5)	P values	Comments
Adhesive bowel obstruction	3	1	1	0.3	NS
Wound dehiscence	2	0	2	0.05	S
Stitch granuloma	1	1	3	0.05	S
Anastomotic leak	0	0	1	0.05	S
Sepsis	1	0	1	0.05	S

NS: Not significant, S: Significant.

Table 7: Complications after colostomy closure.

meconium plug syndrome (2.35%), necrotizing enterocolitis (1.18%) and total colonic aganglionosis (0.01%). Ameh et al. [5] reported ARM in 58.9%, Hirschsprung's disease in 17.3%, intestinal atresia in 6.7%, malrotation in 2.6%, obstructed inguinal hernia in 7.3%, and meconium plug syndrome in 0.7%. Osarumwense et al. [6] reported ARM in 39.4%, Hirschsprung's disease in 11.3%, intestinal atresia in 11.3%, malrotation in 8.5%, neonatal sepsis in 7.0%, necrotizing enterocolitis in 5.6%, obstructed inguinal hernia in 5.6%, spontaneous perforation in 4.2% and meconium plug syndrome in 2.8%. Klein et al. [8] reported necrotizing enterocolitis in most of his cases, followed by Hirschsprung's disease in the developed world. As reported by Dillon et al. [9] and Lister et al. [10], intestinal atresia is a common cause of neonatal intestinal obstruction (one third of the cases) in the developed world, which is in contrast to that reported by us.

As evident, colostomy was the most common procedure performed in our set of patients (41.18%), followed by anoplasty (26.47%), resection anastomosis (12.35%), resection anastomosis with diverting ileostomy (3.51%), Ladds procedure (2.94%), peritoneal lavage with ileostomy (2.35%), primary closure of perforation with peritoneal lavage (1.76%), resection with ileostomy (1.18%), Bishop Koop's procedure (0.01%). Conservative treatment was used in 7.65% neonates (anal dilatation in 4.71%, rectal washes with water soluble dye / normal saline in 2.94% ; Gastrografin is a hyperosmolar (1,900 mOsm per L) aqueous solution of meglumine diatrizoate, containing a wetting agent, 0.1% polysorbate 80 (Tween 80), and 37% iodine). This is in concordance to that reported by Osarumwense et al. [6] who reported colostomy in 38.03%, followed by anoplasty (12.67%), resection anastomosis (14.08%), Ladds procedure (8.4%), peritoneal lavage with ileostomy (2.8%).

The overall complication rate in our study was 17.95%, which is comparable to that given by Ameh et al. [5] (16.8%) and Osarumwense et al. [6] (18.48%). An overall mortality of 14.10% was seen in our study and it is lesser than that reported by Ameh et al. [5], Momoh [11] and Adejuyibje [12] who reported a mortality of 21%, 47% and 44.6% respectively. Of these, 5 had ARM, 9 Hirschsprung's disease, 2 had volvulus with perforation, 2 had intestinal atresia, 2 had meconium peritonitis, and 1 had necrotizing enterocolitis and 1 total colonic aganglionosis. Most of the patients died because of complications like sepsis (5), refractory coagulopathy (7), and anastomotic leaks (4). The mortality was higher in patients with respiratory distress (10, 45.45%), severe hypothermia (9, 40.91%), severe fluid/electrolyte abnormalities (8, 36.36%) A total of 70 colostomies were performed in our set of patients with a male-female ratio of 1.59 which differs from that of 4 as reported by Nour et al. [13], but is comparable to that of 2.1 as reported by Uba et al.[14]. Most of the colostomies were performed for Hirschsprung's disease (58.57%). This is similar to that reported by Nour et al. [13] (Hirschsprung's disease 63%), Uba al [14] (Hirschsprung's disease 59%), Mollit et al. [15], Park et al. [16]. The overall stoma related complications were higher for transverse colostomies in our study (38), although it spared the entire left colon for reconstruction. This is in concordance to that reported by Uba et al. [14] and Park et al. [16]. The overall complication rate is 21.43% after colostomy formation and 14.06% after colostomy closure. This is similar to that reported by Park et al. [17], Nour et al. [13], and Hutan et al. [18].

Colostomy closure requires a thorough planning, pre-operative, intra operative and post-operative. Samhouri advocated that colostomy take down should be considered as a major colonic resection. The colostomies were closed in 91.42% of our patients; all closures were intraperitoneal (resection of the exteriorized colon followed by end to end, mostly single layer, interrupted non absorbable sutures). Adhesion obstruction was present in 5 of the patients with colostomy closure (7.8%) which is slightly more than that reported by Nour et al.[13] (3%), Lister et al.[19] (4%) and Sulaiman et al.[20] (4%), but lesser than that reported by Beck et al.(10%). This seems to be because of the shorter follow up period in our patients. 9 (14.06%) of our patients developed surgical site complications. This is lesser than that reported by Uba et al. [14] (20%) and Adejuyigbe et al. [12] (26%).

The overall mortality following colostomy formation / closure is 9.37% in our series [6 patients (1 sepsis following anastomotic disruption, 1 protracted severe colostomy colitis, status epileptics 2, aspiration pneumonia 1, pre-operative hemodynamic instability 1), although only 3 of these died because of causes directly related to colostomy (4.7%; 2 had sepsis following anastomotic disruption and 1 died because of severe colostomy diarrhoea)]. This is lesser than that reported by Uba et al. [14] (13.8%). Colostomy related deaths are comparable to that reported by Mollit et al. [15] (2.7%) and Lister et al. [19] (3.8%).

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