Neonatal Gastoinestinal Perforations

*Hasan K. Gatea FICMS Paed. **Raghad J. Abulhab FICMS Paed.

Abstract:

Background: Gastrointestinal tract (GIT) perforation in neonates is a serious problem for paediatric surgeons especially extremely low birth weight which continue to have a high mortality rate.

Methods: A prospective study for 36 neonate were seen and operated upon in Al- Kadhymia Hospital for Children and Al- Mustansiria Hospital during the period 2006 – 2010.

Results: There were 36 neonate proved to have GIT perforation (21(58.3%) male and 15 (41.7%) female. Their birth weight ranged from 1500 – 3600 grams with average age at presentation was 4 days.

Main causes of perforations included necrotizing enterocolitis (NEC) 36%, spontaneous gastroduodenal perforations 11.1%, anterior abdominal wall defect 11.1%, spontaneous intestinal perforation11.1%, iatrogenic intestinal perforation 8.3%, Hirschsprung`s disease, ileal atresia & meconiun ileus were reported in 5.6% and volvulus & imperforate anus were reported in 2.8%.

Twenty two patients (61%) were treated by primarily repair (debridement and repair or limited resection and primary anastomosis). Overall mortality rate 47.2%.

Conclusion: It is necessary to substantially improve the level of medical treatment especially for premature baby under both 1500 grams & 32 GWs to prevent secondary pathology by early recognition and management of primary pathology. Rectal temperature monitoring and herbal enemas should be discouraged.

Keywords: Gastrointestinal perforation, necrotizing enterocolitis, low birth weight neonate.

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Introduction

Perforation of gastro-intestinal tract may occur in the neonate any where from the esophagus & the rectum. Apart from necrotizing enterocololitis, perforations may occur secondary to intestinal obstruction, ischemia, over distension, a gangrenous volvulus, or in association with drug therapy (1).

Despite the recently improved neonatal intestine management, such as ventilator management, availability of antibiotics and other medicines, and operative and anesthetic techniques, gastrointestinal perforation during the neonatal period is still a major problem for paediatric surgeons. (1, 2) .

The need for advanced life support for neonate in the delivery rooms increases with low birth weight . The support includes positive pressure ventilation which is commonly done by bag and mask, in which gastric ventilation and subsequent distension is one of inherent problems, passing a nasogastric tube and ensuring free drainage of gastric air and fluid should form part of any resuscitation effort this allows insufflated air drain there by decompressing the stomach, improving intramural blood supply, reducing the risk of long ischemic perforation and allowing fluid resuscitation to restore to normal circulation(3).

methods

This prospective study includes 36 patients, who sustained an acute free perforation of the alimentary tract. These cases include only those patients who extruded alimentary tract content into peritoneal cavity, those with fistulae or localized abscess were not included. These patients were seen and operated upon at Al-Kadhymia Hospital for Children and Al-Mustansiria Hospital, in the period from September 2006 – September 2010. The clinical detail were reviewed and recorded including the mode of presentations ,duration of symptom, radiological findings, methods of diagnosis, operative findings, treatment and complications.

Result

Thirty six neonates indentified and proved to have gastrointestinal perforation, 21 male (58.3 %) and 15 female (41.7 %) with a male to female ratio 4:3, with an average gestational age 35 weeks. Their birth weight range from 1500 – 3600 grams. Twenty two (61%) were delivered pervagina and 14 (39%) were born by caesarian section. Indications being cephalo– pelvic disproportion, poor

prognosis, abruption placenta, eclampsia, pre-eclampsia, premature rupture of membrane and fetal distress. The averge age at presentation was four days with a rang of 1 – 30 days

Table(1) Causes of perforation

Diseases	No. of patients	%
NEC	13	36
Hirschsprung`s disease	2	5.6
Iatrogenic perforation	3	8.3
Ileal atresia	2	5.6
Meconiun ileus	2	5.6
Volvulus	1	2.8
Spontaneous gastro- duodenal perforation	4	11.1
Spontaneous intestinal perforation	4	11.1
Imperforate anus	1	2.8
Gastroschisis	3	8.3
Exomphalos	1	2.8
Total	36	100%

The causes of perforation are summarized in (Table 1) the main causes of perforation included NEC 13 (36%), Hirschsprungs disease 2 (5.6%), spontaneous gastro-duodenal 4 (11.1%), anterior abdominal wall defect (Gastroschisis and Exomphalos) 4 (11.1%), Spontaneous intestinal perforation 4 (11.1%), iatrogenic intestinal perforation 3(8.3%), each of ileal atresia and meconium ileus 2(5.6%), and each of volvulus and imperforate anus 1 (2.8%).

Table (2) Distribution of perforations

Site of perforation	No. of patients	No. of (%) deaths
Small bowel	16 (44.4%)	5 (31.3%)
Colo-rectal	13 (36.1%)	7 (53.8%)
Stomach & Duodenum	4 (11.1%)	2 (50%)
Small & large bowel	3 (8.3%)	3 (100%)
Total	36 (100%)	17 (47.2%)

The site of perforation are summarized in (table 2). 16 patients (44.4%) had perforation in the small bowel, 13 patients (36.1%) in the large bowel, 3 patients (8.3%) had extensive type of NEC involving small and large bowel with multiple sites of perforations, 3 patient (8.3%) had perforation in the stomach and 1 patient in the duodenum.

NEC was the most common of perforation in thirteen patients (36.1%) and the terminal ileum was the most common site of perforation6 of the 16 patients with small bowel perforation and 4 of the 14 patients with colo-rectal perforations had NEC.

Abdominal distension was the presenting feature in 34 (94.4%) of the patient excluding the four patients with an anterior abdominal wall defect, 10 (27.8%) patients had features of sepsis, namely fever, tachycardia, low platelet count and raised white blood cell count at presentation, 2 (5.6%) patients who had meconium peritonitis presented with a mass in the right iliac fossa at birth. Herbal enemas had been given prior to perforation in 2 patients while one developed abdominal distension in the nursery following rectal stimulation by thermometer.

Three out of the 4 neonate with spontaneous gastro-duodenal perforation were male and one female. The average birth weight was 2.0 kg.

The abdominal distension was the main presenting features, features of sepsis, respiratory distress and haematemesis and shock were the other presenting features.
Perforations were located at the posterior wall near the greater curvature in three cases and in the first part of duodenum in one, two of these four neonates survived. The main causes of death were respiratory failure and fulminating sepsis.
The small bowel was involved in 16 (44.4%), the most common site of perforation being the terminal ileum which occurred in 9 patients. The jujeunm was involved in 2 neonates while five perforations were not specified. Secondary perforations occurred in 6, idiopathic in 5 and NEC was the cause in 5 .Primary pathology in secondary perforations included: gastroschiasis, examphalos and another 2 infants with meconium ileus presented with perforation at dilated proximal part.
The perforation occurred in utero in 2 cases of meconium ileus, a significant intraperitoneal adhesions and calcifications were noted in both of them.
The colon was involved in 13 out of 36 patients, with the caecum being the most common in six cases, 2 patients had a sigmoid colon perforation, 2 had a rectal perforation, while transverse colon was involved in 3 neonates.
Secondary perforations occurred in six, idiopathic perforations in 2 and NEC was the causes in 5. Underlying pathology in secondary perforations include herbal enema, rectal thermometer, high ano-rectal malformation and Hirschsprung's disease.
Diagnosis of perforations was established by the presence of pneumo peritoneum in 30 (83.3%) patients.
In 2 patients, the perforation detected accidently during laparotomy
performed for intestinal obstruction and peritonitis secondary to suspected gangrenous intestinal loop in babies with NEC .
Perforations were primarily repaired in 22 (debridement and repair or limited resection and primary anastomosis) and stomas were performed in 12, procedure was abandoned in 2 with extensive necrosis as shown in table (3).

Table (3) Types of Surgical procedure

Surgical procedure	No. of pat	%
Simple closure of defect	9	25%
Resection and primary anastomosis	13	36%
Resection and stomas	12	33.4%
Procedure was abandoned	2	5.6%
Total	36	100%

Initial antimicrobial cover in all patients consisted of combination of penicillin, gentamicin and mertroniadzole or cefotaxine and mertronidazole, culture and sensitivity results of peritoneal fluid taken at operation guided subsequent antimicrobial treatment.
Nineteen (52.8%) of the neonates were survived while 17 (47.2%) died. Of those who died, 9 (52%) were premature, sepsis was the cause of death in 13 (76.5%).
Patients who had gestational age more them 33 weeks and those with birth weight more than 2500 grams had lower mortality rate.
Twenty three (63.9%) patients were referred from peripheral hospitals had higher mortality rate.

Table (4) post operative complications

Complication	No. of pat	%
Wound infection	7	36.8%
Septicemia	4	21.5%
Intra-abdominal abscess	3	15.8%
Anastomotic leak	1	5.3%

Partial dehesince	1	5.3%
Abdominal burst	1	5.3%

Table 4 shows the significant complications in the post operative period and their frequency in nineteen survivor neonates

Discussion

Although NEC was the predominant cause of perforation in our series its percentage (34.2%) was significantly less than the 62.5% 68% reported by others (4,5). some investigators , have found an increasing incidence of NEC perforation as more low birth weight neonates survive as a result of improvement of perinatal care (6) .

Spontaneous gastric perforation was the second most common entity in our series as well as other large series (4,5)

Our patients with spontaneous gastric perforation showed some characteristic features such as male preponderances, the location of perforation of greater curvature of the stomach and the timing of perforation within first two weeks of life which is similar to other series (7,8)

Although our 4 neonates with gastroduodenal perforation were very sick, two of them survived, other studies have reported varied mortality rates ranging from zero to 100% mortality (9, 10,11)

Treatment and investigative procedures performed for the neonate can cause perforation of the gastrointestinal tract (12) as in three of our patients which is one of alarming findings in our series was the relative high frequency of iatrogenic colorectal perforation (8.3%), unfortunately, these three cases of perforation were potentially preventable. Herbal enemas were responsible for sigmoid colon and rectal perforation in two neonates while rectal manipulation by thermometer was responsible rectal perforation in one and this result was similar to kuremu study (6) ,in developing countries rectal temperature monitoring and herbal medicinal insertions are common. Avoidance of this practice in the developed world has led to a decline in rectal perforation(12) .Care directed at reduction of perinatal asphyxia, shock and stress is essential in the prevention of gastric ischaemia and NEC related perforation(3).

.The prognosis of neonates with perforated viscous depend on several factors, these include birth weight, gestational age, extent and type of underlying pathology and the severity of associated anomalies (13), both birth weight and gestational age proved to be significant prognostic factors in our study as in some other series (14,13)

The delay in diagnosis of perforation carries an important prognostic value. The two neonates, who had immediate recognition of iatrogenic perforation during urgent laparotomy, on contrast, delayed recognition of this complication result in death of one neonates with iatrogenic rectal perforation by thermometer. The main causes of delayed in diagnosis of perforation were infrequent taking abdominal radiograph and lack of recognition of various radiographical signs of pneumoperitoneum in supine position such as "anterior superior oval", air dome, free air at the flank& air in the scrotum (15).

Twenty three patients(63.9%) were referred from peripheral hospital, the long duration between perforation and definitive treatment as well as inadequate pre-operative resuscitation both have a negative effect on the out come of treatment (16,17). Decompression of pneumoperitoneum by percutaneous drainage relieves respiratory distress and also decreases the progression of peritoneal contamination and subsequent sepsis (6), and this procedure is preferable to done in referring hospital prior to transport,in our work showed this procedure not performed to any patient presented to our hospitals with gastrointestinal perforation ,this is one of the causes lead to increase mortality rate in our study.

Despite advances in perinatal care, gastrointestinal perforation continue to carry 40% - 70% mortality (6, 18). NEC has been ranked as the leading cause in many large series (16,19, 14).

Recent trends in the management of gastrointestinal perforation are moving toward simple closure or resection and primary anastomosis (20). This trend has its impact on decreasing length of hospital stay ,the time to full feeds and the time on ventilator (21). Our

work in agreement with others (20,21), who advocate immediate reconstruction of bowel continuity as the best form of treatment and reserve creation of stoma in specific instances when circumstances may warrant that.

Conclusion

At the present time, neonatal gastrointestinal perforation is still a major problem for paediatric surgeons in our hospital , especially premature babies under both 1500 g and 32 GWs. It is therefore necessary to substantially improve the level of medical treatment for such immature babies.

The relative high number of iatrogenic perforations in this series dictates a strict policy for colonic wash and rectal manipulations by thermometer.

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*Paediatric Surgeon, College of Medicine, Baghdad University, Iraq
** Paediatric Surgeon, Al-Kadhymia Hospital for Children