

Neonatal Intestinal Obstruction in Mosul City

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ABSTRACT:

BACKGROUND:

Intestinal obstruction is the most common surgical emergency of the newborn. Those cases require specialized care and facilities for survival. It may be caused by several embryonic and functional anomalies. we studied the causes of neonatal intestinal obstruction in mosul in the north of Iraq to get data that was not available about this subject.

OBJECTIVE :

To study the causes of neonatal intestinal obstruction and the pattern of their distribution in Mosul city and its drainage areas in the north of Iraq.

METHODS:

A prospective study of 156 cases with neonatal intestinal obstruction ,all of our patients were managed in Al-Khansa' teaching hospital in the period between(February 2001-2003).

RESULTS:

The male:female ratio was 1.9:1. Mean duration of symptoms 4.33 days. The most common cause was imperforate anus(22.4%), followed by intestinal atresia (15.4%), meconium plug syndrome (13.5%), medical causes (12.2%), congenital megacolon (11.5%), neonatal perforation (4.5%), necrotizing enterocolitis (NEC) and simple meconium ileus (3.9%) malrotation (2.6%), respectively and other rare causes (< 2%). The overall mortality was 22.2%. the mean duration of hospital stay 5.4 days.

CONCLUSION:

The causes of neonatal intestinal obstruction and the percentage of each cause are in variance with other studies. Imperforate anus and functional causes (e.g. ileus, sepsis) were higher, while intestinal atresia , meconium ileus and malrotation were lower than recorded by others.The mortality is near to that in developing countries with higher mortality in cases of necrotizing enterocolitis, meconium ileus and other rare causes of obstruction; delayed presentation and the lack of neonatal intensive care units at the time of the study being the main problems, that resulting in high mortality rate.

KEYWORDS: neonatal intestinal obstruction.

INTRODUCTION:

The neonatal period is defined as less than 28 days of life.⁽¹⁾ Intestinal obstruction is the most common surgical emergency of the newborn.⁽²⁾ It accounts for more than 20% of the admissions to the surgical unit.⁽³⁾

These cases require surgical management by pediatric surgeons in medical centers with facilities of anesthesia, radiology and specialized pediatric nursing care. Better results in their treatment have dependant mainly on earlier diagnosis.⁽⁴⁾

The overall incidence is difficult to estimate because it may result from a variety of embryonic anomalies and functional abnormalities.⁽²⁾ However the incidence is approximately 1/2000 live births.^(4,5) . In our locality there is no data previously recorded about this subject. Intestinal obstruction may be caused by several conditions in the neonate; many of them had been described since a long period of time . it may result from:

- Intrinsic developmental defects arising from disordered embryogenesis.
- Abnormalities of peristalsis and / or intestinal contents.
- A secondary insult acquired in utero, after normal intestinal development.⁽⁴⁾

CAUSES OF Neonatal Intestinal Obstruction. (N.I.O.)⁽²⁾

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❖ COMMON

Imperforate anus^(4,6,7,8), malrotation (duodenal obstruction, volvulus, internal hernia), duodenal atresia, stenosis or annular pancreas, jejunal atresia or stenosis, ileal atresia or stenosis, simple meconium ileus, meconium ileus with perforation, meconium plug syndrome, Hirschsprung's disease, Drug-induced ileus.

❖ UNCOMMON

Tumors, intussusception, segmental intestinal dilatation, small left colon syndrome, milk bolus obstruction, colonic atresia, functional intestinal obstruction, intestinal pseudo-obstruction, neonatal intestinal dysplasia, megacystis-microcolon-hypoperistalsis syndrome.

The majority of neonates with I.O. present shortly after birth, yet prenatal diagnosis of obstructive gastrointestinal lesions is possible in selected patients.

Maternal Polyhydramnios, Failure to pass meconium with progressive abdominal distention, refusal to feed and vomiting of bilious intestinal contents is the classic clinical signs of I.O in neonates.^(6,7,8)

The outcomes from N.I.O. vary with the etiology of the obstruction. Overall survival is generally good but often is influenced by the associated anomalies of each condition.² The high mortality of earlier years have been reduced by improved obstetrical care, perinatal diagnosis of pathology, perinatal support including pediatric intensive care, improved anesthesia and surgical techniques, in addition to the appropriate management of associated abnormalities.⁽⁴⁾ The overall mortality rate should be less than 5%.⁽⁹⁾

PATIENTS AND METHODS:

A prospective study, 156 neonates admitted or referred to the pediatric surgery center in Al-Khansa hospital over a period of two years (Feb. 2001-2003) under the diagnosis of intestinal obstruction.

The diagnosis was made mainly depending on clinical and radiological grounds in few cases the exact diagnosis was only achieved after operation. Prenatal diagnosis was not done in any of the cases recorded.

All of them were resuscitated first. Most of the patients required surgical intervention, others were treated conservatively. Total parenteral nutrition was only used in few cases because of unavailability during the time of the study. Records were reviewed for the age, gender, gestational age, weight, duration of symptoms,

associated anomalies, the cause of intestinal obstruction, procedure done, morbidity and mortality, and duration of hospital stay.

Cases of imperforate anus were excluded from the study except those who presented as neonatal intestinal obstruction. Many authors regarded pyloric obstruction as part of neonatal intestinal obstruction; in the present series they did not included because the pylorus is part of the stomach rather than the intestine.

RESULTS:

Of the 156 patients, 103 were males (66 %), 53 females (34 %) with a ratio of (1.9:1). The age at presentation varied between 12 hours-30 days with a median age of (7.3 days).

The mean weight for the patients was (2.93 kg) ranging from 1-4.5 kg.

The gestational age ranged between 30-42 weeks (23 were premature, 2 were post term and 131 were at term). The mean gestational age was (38.25 weeks).

The duration of symptoms before the patient was presented to the unit varied widely (between 6 hours –26 days), but the majority had the symptoms for (1-10 days); the mean duration of symptoms was (4.33 days); the patient who presented after 26 days had malrotation with internal herniation and marasmus.

The causes of neonatal intestinal obstruction were listed in (Table 1) according to the number of cases recorded with the percentage for each one (from the most common to the least one).

The percentages of deaths for each cause of neonatal intestinal obstruction, with the causes of death are listed in the (Table 2). The overall death rate was (21.2%). The most common causes were sepsis, electrolyte disturbances and respiratory embarrassment, mostly due to delayed presentation and lack of strict post-operative isolation and intensive care. Associated anomalies, poor immunity and delayed wound healing was another causes in older patients.

The duration of hospital stay ranged between 1 and 23 days, with a mean duration of 5.4 days.

DISCUSSION:

The male/female ratio affected by this condition was found to be 3:1 by Ameh EA *et.al* in their study.⁽¹⁰⁾ In the present series males affected were also more than females, but in a ratio of about 2:1.

The risk factor for any neonate with I.O. is the delay in the diagnosis and operative intervention.

The majority of newborn children suffering from I.O. in the United Kingdom are admitted within 48 hours of birth.³ While in the developing countries the period before presentation is longer, It was reported in Nigeria to be 4 days.⁽¹⁰⁾ Which is nearly similar to the present series (4.33 days). It will depend on the alertness of midwives and pediatricians and a high level of suspicion when a child fails to pass meconium during the first 48 hours or vomits green.

The most common cause of intestinal obstruction is imperforate anus in the western countries and in developing countries as demonstrated by Ameh (68.9%)¹⁰, Adeyemi (38%)¹¹ and by Nasir et al in Basrah (27.8%)⁽¹²⁾. In the present study we have excluded cases of imperforate anus diagnosed by anal examination, and including only those who were presented as a cases of neonatal intestinal obstruction. Even so, this was the most common cause in this study as it accounts for about (22.4%) of all cases. This is probably because of larger number of home deliveries and lack of thorough examination of neonates.

Intestinal atresias accounts for approximately 30% of cases of N.I.O.^(4,13) and up to 50% in some series⁽²⁾, but in the series of Ameh it was accounted for 6.7% of cases only.¹⁰ In the present series intestinal atresia accounted for 15.4% of cases. Which is less than most of the series except for the last one.

Duodenal and jejunoileal atresias occur in approximately equal numbers^(2,4,15), Nixon and Tawes noted a ratio of 2:1⁽¹⁶⁾. In Lagos jejunoileal atresia was more (21%) than duodenal (8%).⁽¹²⁾ In Basrah equal number of cases were recorded¹². In the present series duodenal atresia was found in a slightly higher incidence (54%) than jejunoileal atresia (about 42%) with a ratio of 1.3:1. Evaluating jejunoileal atresias de Lorimier, Fonkalsurd and Hays noted 19% were typeI, 31% typeII, and 46% typeIII.⁽¹⁴⁾

In the present series type I & II has not been noticed, and type IIIa was the most common (50%). Ros-Mar et al observed type IIIb atresia to occur in (32%) of jejuno ileal atresias.⁽¹⁴⁾ Martin, however, observed it in (11%).^(6,7,8) In the present series was (40%) of atresias which is higher than all. Multiple atresia found to occur in about 10-20%.^(4,15) In the present series it was also 10% of all atresia. Colonic atresia in the present series accounted for 4.2% of intestinal atresias and was of type I only. This percentage lies within a wide

range reported by other series (between 1.8-15 %).⁽¹³⁾

Jejunoileal and colonic atresias can occur simultaneously in the same patient but rarely occur with duodenal atresia.⁽¹⁵⁾ In the present study one patient was found to have ileal with colonic atresia. Another patient have duodenal atresia in the second part with absent third and forth parts, associated with typeIIIb jejunoileal atresia, which is an odd anomaly. One of our patients with ileal atresia was found to have intussusception in the distal segment, which could be the cause of atresia, Mcheik JN have reported a similar case in poitiers, France.⁽¹⁶⁾ The single patient with two jejunal atresias has associated cystic duplication and torsion of these cysts at the gap of the proximal atresia, which could be the cause.

Meconium plug syndrome is a frequent cause of N.I.O., however, incidence figures are not available.⁽¹⁷⁾ In a radiological analysis it was found in 66% of cases.⁽¹⁵⁾ In the present series it accounts 13.5% of the cases, all improved by conservative treatment.

An extragastrointestinal conditions can lead to functional ileus which can closely mimic mechanical I.O.^(4,18) the present study revealed that about 12.2% of admissions were because of functional ileus. In the United Kingdom such admissions are attributed to the price paid for early referrals. However, in our locality this could be due to over suspicion by some pediatricians, and difficult follow up of the patients by the surgeon if they remain in another pediatric hospital.

Congenital megacolon accounts for 20-25% of cases of N.I.O.^(6,7,8) In two series in the United Kingdom and Chicago, it accounted for 14.5% and (11.6%) respectively.^(3,19) In developing countries it was reported to be (14%) and (7.3%) by Ameh¹⁰ and Adeyemi¹¹ and was the second common cause of N.I.O. in the latter. The present series reported that (11.5%) of the cases were of Congenital megacolon. This is probably less than the western countries but is within the ranges encountered in the developing countries.

The exact incidence of perforations in the GIT is unknown.^(2,19) In a series in the children's memorial hospital the most common site involved was found to be the small bowel followed by the stomach, duodenum and lastly the large bowel.⁽¹⁹⁾ The present series reported localized, isolated perforations to occur in (4.5%) of cases, 57% in the transverse colon,

28% in the ileum, 14% in the stomach, and no reported perforation in the duodenum. In addition there were two cases of ileal perforations secondary to necrotising enterocolitis, one jejunal because of atresia and two perforations (in the appendix and transverse colon) because of Congenital megacolon. All were due to delayed presentation because of family neglect.

Necrotising enterocolitis accounts for 1-8% of admissions to the intensive care units in the United States.⁽¹⁵⁾ It is rare in Switzerland, Scandinavia and Japan.^(2,13) The association of prematurity and NEC is underscored by the fact that the incidence of NEC is extremely low in countries that have very low premature birth rate. Nasir reported 5.6% rate in Basrah.⁽¹²⁾ In the present series NEC accounted for 3.9% of cases. Two thirds were presented with complications and died. Delay in the diagnosis of such a serious condition, in addition to prematurity, carries a very poor prognosis.

The present series found that meconium ileus was the 7th common cause of N.I.O. and accounted for 3.9%. It accounts for 30% of cases with N.I.O. according to De Lorimire.^(6,7,8) Nasir⁽¹²⁾ reported 11% in Basrah. However, Ameh¹⁰ found that it is not a common cause (the least in his list), Adeyemi⁽¹¹⁾ did not report any case in his study. Lim⁽²⁰⁾ labeled it as a rare cause in Malaysia (3.7%). Although the figure in this series is much lower than in the western, it is near to the reports in developing countries. The association with cystic fibrosis needs to be further evaluated in our locality.

Malrotation occurs in 0.2-1% of the population, 50% of them presented in the first month of life.^(2,15,17) Nasir⁽¹²⁾ reported 5.6% in his study. Ameh⁽¹⁰⁾ labeled it among the less common causes. The rate in the present study was 2.6%, which is a bit lower than others.

Intrauterine perforation in the present study was not a common cause (1.28%) and similar to what was reported in other studies.⁽¹⁹⁾

Secondary peritonitis due to complicated surgery is an infrequent complication. It was not a common cause (1.28 %)(2 cases). It occurred due to lack of experience and care in an unspecialized center.

Other rare causes include isolated internal herniation through the mesentery of the ileum, idiopathic small intestinal volvulus, which had been also reported by Ameh⁽¹⁰⁾; megacystis-microcolon-hyperperistalsis syndrome,

segmental dilatation of the transverse colon and idiopathic ileocolic intussusception (0.64%) (each one case).

Omphalomesenteric duct band, a rare presentation in the neonatal period had been also recorded by Gaisie *et.al* in 3 cases.⁽²¹⁾ Segmental dilatation of the ileum an odd finding had also been reported by Kuint *et.al*.⁽²²⁾

Rectal duplication is a rare pathology, with interesting histopathology in the present case. Gross found that it constitute 5.8% of all GIT duplications. It may contain gastric mucosa^(15,17), but the finding of all types of GIT mucosa has not been mentioned.

Rare cause of intestinal obstruction which has not been referred to in literatures include: Cord-like bowel found on laparotomy (which could be due to total intestinal aganglionosis or an unusual type of atresia) was encountered in the present study and need further study.

On the other hand other causes of intestinal obstruction like:

Inguinal hernia , Tumors , Milk bolus obstruction ,and Small left colon syndrome^(2,13,15) were not met with in the present series.

The major risk factor in any neonate with intestinal obstruction which contribute to the mortality is the delay in diagnosis and surgical intervention.⁽³⁾ The additional second risk factor is the presence of associated anomalies.⁽²⁾

The overall mortality rate in the present study was (21.2%) this goes with those reported in the developing countries (by Nasir¹² 22%, Ameh¹⁰ 21.1% and by Adeyemi⁽¹¹⁾ 38%), but it is still higher than in western countries (about 5-10%).^(9,18) This is because of delayed presentation of cases especially those from distant areas and towns far from the specialized centers, lack of intensive care units ,TPN and some other special materials may add to the problem.

However, we found that the mortality rates of the common conditions specially Congenital megacolon, intestinal atresia, intestinal perforation, volvulus and malrotation were less than what was reported in studies in developing countries.^(10,14) That of imperforate anus nearly the same, and of necrotising enterocolitis, medical causes and other rare or complicated cases were high.

The duration of hospital stay (mean 5.4 days) was shorter than that recorded by others.

CONCLUSION:

The causes of neonatal intestinal obstruction and the percentage of each cause are in variance with other studies. Imperforate anus and functional causes of obstruction were higher, while intestinal atresia , meconium ileus and malrotation were lower than recorded by others. The mortality is near to that in developing

countries, with higher mortality in the rare cases, in necrotizing enterocolitis and in meconium ileus.

The main problems were delayed presentation and lack of specialized neonatal intensive care units.

Table 1: Causes of Neonatal Intestinal Obstruction

Causes		No. of patients	Percentages
Imperforated anus		35	22.4 %
	Low	21	
	High	14	
Intestinal atresia		24	15.4 %
	Duodenal	13	
	Jej-ileal	10	
	(type IIIa)	5	
	Christmas tree (type IIIb)	4	
	Multiple (type IV)	1	
	Colonic (with ileal atresia)	1	
Meconium plug syndrome		21	13.5 %
Medical		19	12.2 %
Congenital megacolon		18	11.5 %
Neonatal perforation		7	4.5 %
	Large bowel	4	
	Small bowel (ileum)	2	
	Stomach	1	

NEONATAL INTESTINAL OBSTRUCTION

Cont.... table(1)		
causes	No. of patients	percentages
<i>NEC</i>	6	3.9 %
<i>Meconium ileus (simple)</i>	6	3.9 %
<i>Malrotation</i>	4	2.6 %
<i>Mescillaneous (rare) causes</i> Intrauterine perforation Secondary peritonitis with fecal fistula Intestinal neuronal abnormalities	6 (2 each one)	1.28 % each one
Idiopathic volvulus neonatorum Idiopathic internal herniation Intussusception Omphalomesenteric duct band Rectal duplication Megacystis-microcolon-hypoperistalsis syndrome Ligation of omphalocele minor Segmental dilatation of colon Cord like bowel / Segmental dilatation of ileum	10 (one case each)	0.64 % each one

NEONATAL INTESTINAL OBSTRUCTION

Table 2: The Mortality in Neonatal Intestinal Obstruction , with The Causes of Death

Pathology	No. of Deaths	Perc.	Causes
Megacystis-microcolon-hypoperistalsis syndrome Segmented ileal dilatation	1	100%	Sepsis + multiple congenital anomalies
NEC	4	66.7%	Sepsis
Intrauterine perforation Secondary peritonitis + fecal fistula Intestinal neuronal abnormality	1 each cause	50%	Marasmus + sepsis + Electrolyt disturbances
Meconium ileus	3	50%	Electrolyte disturbances+ sepsis + prematurity
Intestinal atresia			Sepsis
Duodenal 4	8	33.3%	Aspiration pneumonia Electrolyte Disturb.
<i>Christmas tree</i> 3			
<i>Jejuno-ileal</i> 1			
<i>Colonic</i> 0			
Neonatal perforation			Sepsis
Small intestine 1	2	28.6%	Respiratory embarrassment Electrolyte Disturb.
<i>Large intestine</i> 1			
<i>Stomach</i> 0			
Imperforate anus			Associated anomalies
High 6	7	20%	Non-functioning colostomy Sepsis Respiratory embarrassment Electrolyte Disturb.
Low 1			
<i>Congenital megacolon</i>	3	16.7 %	Associated anomalies Delayed presentation Sepsis Respiratory embarrassment Electrolyte Disturb.
Medical	2	10.5%	Sepsis
Malrotation Meconium plug syndrome Intussusception Rectal duplication Omphalomesenteric duct band Ligation of omphalocele Segmented dilatation of the colon	0	0%	
The total No. of deaths	34	21.2%	Total Mortality Rate

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