

Bowel Obstruction in the First Month of Life

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ABSTRACT

Background: The aim of this study was to analyze the etiology, symptom frequency, management, and surgical outcome of gastrointestinal obstruction in the first month of life.

Methods: A total of 72 neonates with gastrointestinal obstruction were reviewed over a period of 16 months.

Results: The male to female ratio was 2.4:1. In this study, 75% of the neonates were presented in the first 7 days of life. The mean gestational age was 39.25 weeks. In addition, 68 of the neonates were term babies. The most common cause of admission was anorectal malformation (22%); furthermore, small bowel atresia was observed in 15% of the cases. Vomiting was the most common symptom of gastrointestinal obstruction reported in 31% of the cases, followed by abdominal distension. In this study, the overall mortality after surgery was 17%. The significant determining cause of mortality was sepsis reported in 33% of the cases.

Conclusion: Early referral, diagnosis, and treatment of gastrointestinal obstruction in neonates are needed to improve the survival outcome. The most common cause of neonatal gastrointestinal obstruction was found to be imperforate anus.

Keywords: Anorectal malformation, Bowel atresia, Gastrointestinal obstruction

Introduction

Gastrointestinal obstruction is the most common surgical emergency in the first month of life (1). This condition occurs 1 per 1,500 live births (2). The common causes are imperforate anus, bowel atresia, hirschsprung disease, bowel malformation, and meconium ileus (3). Neonatal gastrointestinal obstruction often manifests itself with a failure of pass meconium, abdominal distension, and vomiting. Early vomiting (first 24 h) suggests an upper bowel obstruction (jejunum or above it), while delayed onset of vomiting indicates a lower bowel obstruction (ileum or below it) (4). The level of the bowel obstruction correlates with the degree of abdominal distension (5).

Proper history taking, clinical examination, and radiological investigations are highly necessary for the diagnosis of gastrointestinal obstruction (3). Early and correct diagnosis of bowel obstruction is of paramount importance for proper management (6). Delay in carrying out surgery may result in bowel infarction, perforation, sepsis, aspiration

pneumonia, and high mortality (3). Delayed diagnosis, prematurity, lack of facilities, and postoperative complications are factors attributing to high mortality (4). This cross-sectional study aimed to analyze the etiology, symptom frequency, management, and surgical outcome of gastrointestinal obstruction in the first month of life.

Methods

This cross-sectional study was conducted over a 16-month period, during September 2017 to December 2018. It included 72 neonates with a diagnosis of bowel obstruction admitted to the Pediatric Surgery Unit of the AlRamadi Children and Maternity Teaching Hospital in Anbar, Iraq. All the newborns who underwent surgery for intestinal obstruction aged up to 28 days were included in this study. The neonates managed conservatively were excluded from the study.

The obtained data included patient's demographics, etiology, diagnostic workup, mode of treatment, and outcome. Chest/abdominal X-ray,

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abdominal ultrasound, and (upper/lower) water-soluble gastrointestinal contrast studies were performed when indicated. All newborns received resuscitation after admission, nasogastric decompression, antibiotics, and vitamin k. All these neonates were surgically treated, and surgical procedures were carried according to the etiology of obstruction. Postoperative care and follow-up were provided for all neonates. Written informed consent was obtained from the neonates' parents. This study was approved by the Ethics Committee of the University of Anbar, Anbar, Iraq.

Statistical analysis

Statistical analysis was performed using SPSS software (version 25, 2017). Frequencies, survival rates, and odds ratios were generated using the cross-tab function. One-sample Chi-square test (goodness of fit test) was used to assess the distribution of the patients among the different subtypes of each category. All tests were conducted using a 95% confidence interval. The threshold for statistical significance was set at a p-value less than 0.05.

Results

Demographic characteristics

A total of 72 newborns with gastrointestinal obstruction were diagnosed during the study period. The male to female ratio was 2.4:1. The mean gestational age was 39.25 weeks (range: 34-42 weeks). Approximately, 68 of the neonates were term, and 4 cases were preterm. In addition, 75% (n=54) of the neonates were presented in the

first 7 days of life, and the rest presented after 7 days of life. In addition, the mean duration of hospital stay was 10.7 days.

Etiology of admission

The most common cause of admission was anorectal malformation found in 22% (n=16) of the cases, while small bowel atresia occurred in 15% (n=11) of the newborns (duodenal atresia in 6 cases, jejunoileal atresia in 5 cases). Moreover, 10, 9, and 6 cases were detected with pyloric stenosis, tracheoesophageal fistula, and Hirschsprung disease, respectively. Each of obstructed inguinal hernia, meconium ileus, and perforated viscus were also diagnosed in 5 neonates. Additionally, each of Meckel's diverticulum and malformation were detected in 2 neonates, and 1 newborn was found to have congenital band obstruction (Figure 1).

Clinical Characteristics

Vomiting was the most common presenting symptom reported in 31% (n=67) of the cases, followed by abdominal distension (n=48, 22%), absent anal orifice (6%), failure to pass meconium (11%), frothy secretion of the mouth (4%), refusal to feed (16%), and irritability (9%) (Table 1).

Outcome of obstruction

Out of 72 neonates in our study, 83% (n=60) of the cases survived. Overall, 17% (n=12) of the 72 cases passed away. The highest mortality (33%) was observed in the newborns with tracheoesophageal fistula (Table 2).

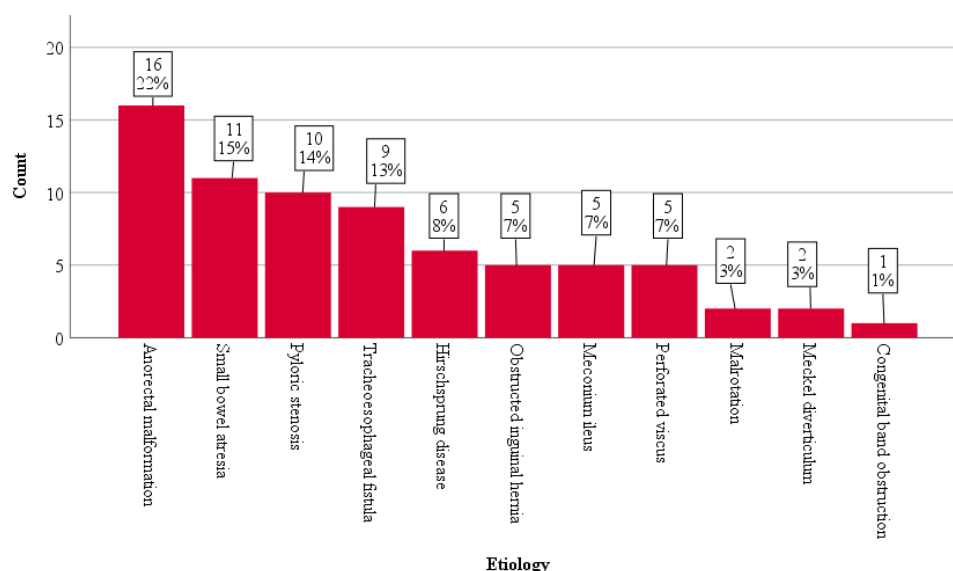


Figure 1. Causes of admission in the study population

Table 1. Frequency of symptoms in the study population

Symptoms	Number	Percentage	Odds ratio	P-value
Vomiting	67	30.7%	13.4	<0.0005
Abdominal distension	48	22%	2	
Absent anal orifice	14	6.4%	0.24	
Failure to pass meconium	25	11.5%	0.53	
Frothy secretion of mouth	9	4.1%	0.14	
Refusal of feeding	35	16.1%	0.95	
Irritability	20	9.2%	0.38	

Table 2. Outcome of obstruction in the study population

Etiology	Survived (%)	Mortality (%)	Total
Tracheoesophageal fistula	6 (67%)	3 (33%)	9
Anorectal malformation	14 (88%)	2 (12%)	16
Perforated viscus	3 (60%)	2 (40%)	5
Small bowel atresia	9 (82%)	2 (18%)	11
Meckel's diverticulum	1 (50%)	1 (50%)	2
Meconium ileus	4 (80%)	1 (20%)	5
Malrotation	1 (50%)	1 (50%)	2
Pyloric stenosis	10 (100%)	-	10
Obstructed inguinal hernia	5 (100%)	-	5
Hirschsprung disease	6 (100%)	-	6
Congenital band obstruction	1 (100%)	-	1
Total	60 (83%)	12 (17%)	72

Table 3. Results of surgery in the study population

Surgical operation	Frequency	Survival rate	P-value
Anoplasty	7 (9.7%)	71%	
Colostomy	15 (20.8%)	100%	
Bowel resection and anastomosis	7 (9.7%)	43% *	
Ladd procedure	2 (2.8%)	50%	
Pyloromyotomy	10 (13.9%)	100%	
Duodenoduodenostomy	6 (8.3%)	83%	0.019
Herniotomy	5 (6.9%)	100%	
Repair of tracheoesophageal fistula	9 (12.5%)	67%	
Release of band	1 (1.4%)	100%	
Bowel irrigation with ileostomy	5 (6.9%)	80%	
Repair of gastric perforation	2 (2.8%)	100%	
Bowel resection and ileostomy	3 (4.2%)	100%	

* Statistically significant increase in mortality rate (P<0.05)

Surgical outcome

In this study, surgery was performed on 72 cases. Different surgical procedures were carried according to the etiology of intestinal obstruction. In this regard, 21%, 14%, 13%, 10%, and 10% of the neonates had colostomy, pyloromyotomy, repair of tracheoesophageal fistula, bowel anastomosis, and anoplasty, respectively. Bowel resection and anastomosis were the main contributors to death (P<0.019; Table 3).

Etiology of mortality

The mortality was attributed to sepsis, anastomotic leakage, preterm birth, apnea, and pneumonia in 33%, 25%, 17%, 17%, and 8% of the neonates, respectively (Figure 2).

Discussion

Gastrointestinal obstruction is the most common surgical emergency in the first month of life (7). In

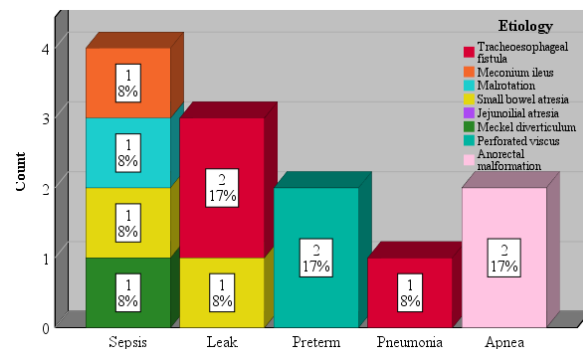


Figure 2. Etiology of mortality in the study population

the present study, out of 72 research participants, 51 newborns were male. Gastrointestinal obstruction was more predominant in males, which agrees with the reports of other studies (4, 5, 8-10). In addition, 75% of the neonates were presented in the first 7 days of life, which is similar to the result obtained by other studies (5, 11, 12). In this

research, the mean gestational age was 39.25 weeks. Approximately, 68 of the neonates were term, and 4 cases were preterm, which agrees with the reports of other series (5, 8).

In this series, the most common cause of admission was anorectal malformation found in 22% (n=16) of the cases, while small bowel atresia occurred in 15% (n=11) of the newborns. Nearly similar results were obtained by Mustefa et al. (8), Iqbal et al. (11), and Rathore et al. (13), reporting imperforate anus (n=29, n=29, and n=206, respectively) as the most common cause of obstruction, followed by bowel atresia (n=7, n=19, and n=42, respectively).

In another study, Verma et al. (3) found that the common cause of obstruction was atresia (n=141), followed by Hirschsprung disease (n=39). According to another study by Singh et al. (6), bowel atresia was the most common cause of obstruction (n=27), followed by Hirschsprung disease (n=17). Rao et al. (7) introduced atresia as the common cause of bowel obstruction (n=53), followed by malformation (n=22). This may be due to the consideration of different inclusion and exclusion criteria.

Vomiting was the most common presenting symptom reported in 31% (n=67) of the neonates, followed by abdominal distension (n=48; 22%). This result is consistent with those obtained by Verma et al (3) and Singh et al. (6), who found vomiting as the most common symptom, followed by abdominal distension. However, Gupta et al. (5) reported that abdominal distension was present in 59% of neonates, followed by vomiting (25%).

Out of 72 neonates in our study, 83% (n=60) of the cases survived. The mortality in our study was 17% (n=12), which is relatively close to the internationally reported rates. Iqbal et al. (11), Rathore et al. (13), Hanif et al. (14), and Islam et al. (15) reported the mortality rates of 9.27%, 13.6%, 15.4%, and 20.8%, respectively. In other studies by Ntia et al. (12), Ademuyiwa et al. (16), and Osifo et al. (17), this rate was high (30%, 28.6%, and 25.4%, respectively). This might be due to the lack of facilities, late presentation, and sepsis contributing to high mortality (18).

In this study, bowel resection and anastomosis were the main contributors to death ($P<0.019$), this might be due to late presentation, anastomotic leakage, and sepsis contributing to high mortality (5). As our results indicated, mortality was attributed to sepsis and anastomotic leakage in 33% and 25% of the patients, respectively. Our results regarding the etiology of mortality are in line with those of

other series (3, 5, 8, 11, 18), indicating sepsis, anastomotic leakage, preterm, apnea, and pneumonia as the risk factors contributing to high mortality.

The highest mortality was observed in the newborns with tracheoesophageal fistula (33%). Verma et al. (3) and Saha et al. (18) reported a high mortality due to intestinal atresia, which can be the result of anastomotic leakage, aspiration, and associated anomalies contributing to high mortality (5, 3). Our study has some limitations, including a short period of study (i.e., 16 months), low sample size, and poor compliance of neonates' parents with follow-up after discharge.

Conclusion

Early referral, diagnosis, and treatment of neonatal gastrointestinal obstruction are needed to improve the survival outcome. The most common cause of obstruction was found to be imperforate anus. Vomiting was the most common presenting symptom of gastrointestinal obstruction, followed by abdominal distension. The survival outcome of obstruction was good. The significant determining cause of mortality was sepsis. Bowel resection and anastomosis contributed significantly to mortality.

Acknowledgments

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Conflicts of interest

None.

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