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SURGICAL INTESTINAL OBSTRUCTION IN THE NEWBORN: AETIOLOGY AND MANAGEMENT

[1]*Ammar Youssef and [2]Wajih Ali

[1]MD, Department of Pediatric Surgery, Tishreen University, Faculty of Medicine, Lattakia, Syria.
[2]Asst. Prof., Department of Pediatric Surgery, Tishreen University, Faculty of Medicine, Lattakia, Syria.

***Corresponding Author: Dr. Ammar Youssef**

MD, Department of Pediatric Surgery, Tishreen University, Faculty of Medicine, Lattakia, Syria.

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ABSTRACT

Background: Intestinal obstruction is the most common surgical emergency in neonates requiring admission to the neonatal intensive care unit (NICU). Given its diverse causes, including intestinal atresia, congenital anomalies, and surgical complications, prompt diagnosis and appropriate management are crucial to improving survival rates and reducing morbidity in affected neonates. **Objective:** To identify the patterns of neonatal intestinal obstruction and the appropriate surgical management. **Materials and Methods:** A retrospective study included all neonates admitted to the Neonatal Intensive Care Unit (NIU) at Tishreen University Hospital between 2017 and 2022 who were diagnosed with intestinal obstruction and underwent surgical repair. Detailed information was obtained from neonates' records (gestational age, age at diagnosis, weight, sex, presence of associated lesions), as well as information on clinical signs and symptoms suggestive of intestinal obstruction, the surgical procedure performed and time of intervention, and the final diagnosis causing the obstruction. **Results:** The study sample included 48 neonates, most of whom were full-term (70.8%). The mean gestational age was 37 weeks, with a mean birth weight of 2664 grams. The mean age at diagnosis and surgical intervention was 7.6 days. It is worth noting that (56.3%) of the sample had concomitant malformations, the most common of which were cardiac malformations (50%). The most frequent clinical sign was Failure to pass meconium (93.8%), while other symptoms and signs were less common. Surgical procedures varied, with intestinal stoma being the most common (58.3%). The final diagnoses included 12 congenital malformations, with anal atresia accounting for the highest percentage (41.7%), followed by malrotation (14.6%). **Conclusion:** Emphasizing the need to follow up on any digestive symptoms that the newborn suffers from by the parents, pediatricians, and pediatric surgeons to help in early detection of any abnormalities to manage them at the most appropriate time.

KEYWORDS: Surgical Intestinal Obstruction - Newborn – Aetiology – Management.

INTRODUCTION

Intestinal obstruction in the newborn is a common surgical emergency that affects approximately 1 in 2,000 live births, making it a common reason for admission to neonatal intensive care units.[1]

The causes of obstruction are diverse with different embryonic origins, with Hirschsprung's disease, malrotation, intestinal atresia, and other conditions such as necrotizing enteritis being the main causes of intestinal obstruction in the newborn. There are also some underlying causes that have not been well described so far.[2]

Obstruction is classified as "high" when the level of obstruction is close to the ileum, and "low" when the level of obstruction is at the ileum or colon. Some cases of intestinal obstruction can also be detected before birth through ultrasound imaging.[1]

Early treatment of patients with intestinal obstruction significantly reduces the incidence and mortality rates. The presence of concomitant congenital malformations and the occurrence of delays in diagnosis and treatment affect the final result.[3]

Newborns with intestinal obstruction therefore need prompt diagnosis and treatment. And although there have been many studies to determine the cause and management of this disease, more study is needed and hence the goal of the research.

Importance and objectives of the research

Due to the fact that intestinal obstruction is one of the most common surgical reasons for admitting a newborn to the intensive care unit and due to the multiplicity of its causes, it is important to determine the frequency of surgical diseases causing intestinal obstruction and the appropriate therapeutic management for them.

PATIENTS AND METHODS

Study population

The research included neonates who were diagnosed with intestinal obstruction in the neonatal care unit at Tishreen University Hospital between 2017-2022 and for whom the cause of the obstruction was determined surgically. While non-surgical causes, and patients who died before the cause of the blockage was determined were excluded. We collected detailed information from patient files, including gestational age, age at diagnosis, weight, gender, presence of associated anomalies, information on the clinical signs and manifestations of intestinal obstruction, the surgical procedure followed and the time of intervention, and the final diagnosis of the cause of the obstruction.

Statistical analysis

The statistical analysis was conducted utilizing IBM SPSS version 20. The basic descriptive statistics included means, standard deviations (SD), medians, frequencies, and percentages. To assess the differences between paired groups, the Friedman test was employed. All tests held significance at a type I error rate of 5% ($p<0.05$), with $\beta=20\%$, and 80% power for this study.

RESULTS

The research sample included 48 neonates, admitted to the Neonatal Intensive Care Unit (NICU) and diagnosed with intestinal obstruction at Tishreen University Hospital during the period 2017-2022, who underwent surgical procedure and met the inclusion criteria for the study. The gestational ages ranged from 28 to 40 weeks, with an average of 37±2.3 weeks, the birth weight ranged from 1000 to 3915 g, with an average of 2664.68±672.6 g, and the age at diagnosis and surgical intervention ranged from 1 to 25 days, with an average of 7.6±2.39 days.

Table 1: Distribution of the study sample by gender and gestational age.

The research sample	N	Percentage %
Male	33	68.8%
Female	15	31.2%
premature	14	29.2%
full-term	34	70.8%

According to Table 1, the study sample consisted of 68.8% males with Sex Ratio(M:F)=2.2:1. And that 70.8% of the research sample were full-term pregnancies.

We also studied the accompanying deformities, and we found the following:

Table 2: Distribution of the study sample according to the accompanying deformities.

The accompanying deformities	N	%
Present	27	56.3%
Absent	21	43.7%
Total	48	100%

We note from the previous (Table 2) that 56.3% of the research sample had concomitant abnormalities. Cardiac abnormalities were the most frequent (50%), followed by ocular, urinary, and digestive abnormalities (6.3% each). Structural and chromosomal abnormalities were observed in 4.2% of cases, while respiratory, maxillary, and neurological abnormalities were less common, each occurring in 2.1% of the sample. Notably, some neonates exhibited multiple malformations.

The study investigated the clinical symptoms and signs in the research sample and the results were as follows:

Table 3: Distribution of the study sample according to the clinical symptoms and signs.

The clinical symptoms and signs	N	%
Failure to pass meconium	45	93.8%
Abdominal distension	37	77.1%
Vomiting	35	72.9%
Respiratory compromise	35	72.9%

Based on the provided data (Table 3), 93.8% of the research sample experienced failure to pass meconium, 77.1% had abdominal distension, 72.9% experienced vomiting, and 72.9% had respiratory distress.

The type of operative procedure carried out is shown in Table 4. Colostomy fashioning was the commonest procedure performed in 28 (58.3%) of the patients for high anal atresia followed by intestinal anastomosis in 8 patients.

Table 4: Distribution of the study sample according to the type of operative procedure.

Type of operative procedure	N	%
Colostomy	28	58.3%
Intestinal anastomosis	8	16.7%
Lad procedure	7	14.6%
Anoplasty	6	12.5%
Deformity Correction	6	12.5%
Eradication	5	10.4%
Adhesiotomy	1	2.1%

Anal atresia with a prevalence of 42% was the most common cause of intestinal obstruction leading to surgery in the studied neonates, followed by malrotation and Jejunal Atresia. Table 5 shows other different causes of intestinal obstruction in neonates during the study period.

Table 5: Distribution of the study sample according to the final diagnosis.

The final diagnosis	N	%
Anal atresia	20	41.7%
Malrotation	7	14.6%
Jejunal Atresia	5	10.4%
Hirschsprung's disease	4	8.3%
Duodenal Atresia	3	6.3%
Ileal Atresia	3	6.3%
Omphalocele	3	6.3%
Necrotizing Enterocolitis	2	4.2%
Meconium Ileus	2	4.2%
Intestinal volvulus	1	2.1%
Adhesions	1	2.1%
Diaphragmatic hernia	1	2.1%

Subsequently, we analyzed the association between anal atresia and various demographic factors, with the following results:

Table 6: The relation between the presence of anal atresia and demographic variables.

Demographic variables		Anal atresia		P-value
		Present	Absent	
Gender	Male	17 (85%)	16 (57.1%)	0.04
	Female	3 (15%)	12 (42.9%)	
Gestational age (week)		37.40±1.8	36.71±2.7	0.3
Birth weight (gram)		2706.25±615.6	2635±720.2	0.7

The relation between demographic variables and the incidence of anal atresia according to the previous (Table 6), shows a statistically significant differences with regard to gender, as 85% of anal atresia cases were male.

DISCUSSION

The study highlights the significance of neonatal intestinal obstruction as a common surgical emergency requiring NICU admission, emphasizing the importance of prompt diagnosis and management to improve outcomes. The finding that a majority of the neonates in the study were full-term aligns with the general understanding of neonatal intestinal obstruction, though the mean birth weight of 2664 grams might suggest some degree of prematurity or intrauterine growth restriction in a portion of the sample. The average age at diagnosis and surgical intervention of 7.6 days underscores the need for heightened awareness and early detection of intestinal obstruction in neonates.

A significant percentage (56.3%) of neonates with intestinal obstruction may have concomitant malformations, particularly cardiac malformations (50% of those with malformations). This suggests a potential association between intestinal obstruction and other congenital anomalies, emphasizing the importance of thorough evaluation for other anomalies in affected neonates. The variability in surgical procedures, with intestinal stoma being the most common (58.3%), reflects the diverse underlying causes of obstruction and the need for tailored surgical approaches. Anal atresia (41.7%) and malrotation (14.6%) are common final diagnoses, providing insight into the patterns of neonatal intestinal obstruction.

In discussing this study in the context of existing literature, it is necessary to explore how these findings correlate with or diverge from other significant research in the field of Pediatric Surgery about neonatal intestinal obstruction.

The first study by Ekpemo et al. (2019) found that 6.75% of neonates admitted to the neonatal care unit suffered from intestinal obstruction, with a male predominance (4:1). The main causes were anorectal malformations (59.3%), Hirschsprung's disease (18.5%), and intestinal atresia (14.8%). The study highlighted that late diagnosis and inadequate neonatal intensive care contributed to mortality.[6]

The second study by Farrokhkhani et al. (2023) identified anorectal atresia as the most common cause of surgical intestinal obstruction (42%), followed by Hirschsprung's disease and duodenal atresia, with a post-operative mortality rate of 4.1% and sepsis being a common complication.[7]

Similarly, a study by Khan et al. (2024) reported that duodenal, ileal, jejunal, and colonic atresia were the most frequent causes, with an overall mortality rate of 10.12%, noting that low birth weight, premature birth, and delayed surgery worsened outcomes.[8]

CONCLUSION

This study emphasizes the crucial role of parents, pediatricians, and pediatric surgeons in the early detection and timely management of neonatal intestinal obstruction. This aligns with the broader consensus that early intervention is paramount in improving survival

rates and reducing morbidity.

DECLARATIONS

Ethical approval and consent to participate: Ethical approval to study was obtained from the Scientific Research Ethics Committee at Tishreen University on November 2023 in accordance with the Declaration of Helsinki.

Consent for publication
Not applicable.

Availability of Data and Materials
All the data generated or analyzed during this study are included in this published article. The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests
None.

Funding
None.

Author Contribution
Ammar Youssef, collected the data, checked the quality of the data collection, analyzed and interpreted the data, designed and coordinated the study, undertook and checked the quality assessment, produced the first draft of the manuscript, wrote and edited the manuscript and approved the final manuscript before submission.

Wajih Ali, was the supervisor of the project; undertook and checked to the quality assessment, checked the quality of the collected data; analyzed and interpreted the data; checked the quality assessment; edited the manuscript and approved the final manuscript before submission.

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