

Original article

Factors influencing outcomes in neonatal abdominal surgery: Surgeons' perspectives

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Abstract

Background: Neonatal abdominal surgery is often indicated by congenital conditions, which present considerable morbidity and mortality risks. However, comprehensive surgical data and identification of complication-related risk factors are still lacking.

Objective: The objectives of this study were to characterize neonatal patients undergoing abdominal surgery and to identify prognostic factors associated with complications and mortality.

Methods: A retrospective study was conducted on newborn patients aged 0–30 days who underwent index surgery at a university hospital from 2013 to 2021. Categorical data were compared between the with and without complications groups. Complications were defined as any events that required intervention, either surgical or medical.

Results: There were 154 neonates undergoing 173 index procedures, and 19 patients had more than one condition. The five most common conditions requiring abdominal surgery included abdominal wall defect (31.0%), colorectal disease (16.0%), intestinal atresia (14.0%), necrotizing enterocolitis (8.0%), and meconium peritonitis (7.0%). The incidence of patients with at least one complication was 44.8%, and the mortality rate was 7.8%. Using logistic regression, factors associated with complications included birth weight <1,000 g ($P=0.01$), APGAR ($P=0.04$), and operative time >110 min ($P=0.03$). Significant influences on mortality were birth weight <1000 g ($P=0.02$), cardiovascular anomalies ($P=0.02$), Congenital Diaphragmatic Hernia (CDH) ($P=0.001$), and platelet count <100,000/ μ L ($P=0.03$).

Conclusion: This study provides valuable insights into factors that influence outcomes in neonatal abdominal surgery. Birth weight <1000 g, CDH, and operative time >110 min were identified as significant contributors to complications. Furthermore, birth weight < 1000 g, cardiovascular anomalies, CDH, and platelet count <100,000/ μ L strongly influence mortality. These findings emphasize the complexity of neonatal abdominal surgery with various conditions. Understanding these prognostic factors can help predict the outcome of neonatal abdominal surgery, and improving these outcomes may be achievable in the future.

Keywords: Neonatal abdominal surgery, neonatal mortality, risk factors, surgical complications.

Neonatal abdominal surgery is often indicated by congenital anomalies.^(1, 2) It carries a substantial risk of complications and mortality due to the physical and physiological fragility and unique characteristics of this patient population. Several factors, including prenatal status, neonatal conditions, and healthcare management, play critical roles in determining surgical outcomes.

Specific clinical conditions associated with prematurity, such as low birth weight and birth asphyxia, are well-known contributors to neonatal morbidity and mortality.⁽³⁾ In addition, other clinical risk factors, such as the pathology type, body temperature management, hematologic parameters, the need for blood transfusions, certain operations, and prolonged operative time, are pivotal in influencing surgical outcomes. Understanding these factors can help healthcare providers optimize care for neonates undergoing abdominal surgery.

In developed countries, advances in prenatal diagnosis and fetal interventions have considerably improved survival rates by enabling the early detection and management of severe anomalies. Prenatal

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management equips parents with a comprehensive understanding that prepares them for the delivery process in appropriate healthcare settings and allows termination of pregnancy in severe congenital malformations.^(4,5) However, in developing countries, these practices are less commonly used, which may contribute to differences in neonatal surgical outcomes.

This study aimed to identify factors affecting the outcomes, specifically complications and mortality, in neonates undergoing abdominal surgery. To achieve this, we performed a retrospective review of medical records and categorized the influencing factors into three main groups: maternal factors, patient factors, and operative factors.

Materials and methods

Study cohort

We performed a retrospective chart review of newborn patients (0–30 days old) who had abdominal surgery between January 2013 and September 2021. Patients who were initially operated on at other hospitals were excluded from the study. All medical records were retrieved after obtaining Institutional Review Board (IRB) review and approval (IRB no. 0211/66).

We collected data on maternal antenatal conditions, neonatal demographic data, details of surgical problems and management, and selected outcomes, including length of hospital stay, complications, and mortality. The retrieved data were categorized into three main groups: maternal factors, patient factors, and operative factors.

- *Maternal factors* included maternal age, mode of delivery, maternal steroid use, pregnancy-related complications, and prenatal diagnosis.
- *Patient factors* included gender, gestational age, birth weight, APGAR score at 1 min (APGAR1), APGAR score at 5 min (APGAR5), respiratory distress syndrome (RDS), diagnosis, cardiovascular disease, associated anomalies or syndromes, hemoglobin, hematocrit, platelet count, and inborn or outborn status.
- *Operative factors* included body temperature, surgical type, index procedure, operative time, intraoperative blood transfusion, and subsequent operations.

Definitions

In this study, complications were defined as any event requiring surgical or medical intervention that resulted from or was related to surgical problems and their treatments, occurring within 30 days of the index operation. All complications were categorized using the Clavien-Dindo Classification. Mortality was considered if it occurred during the same admission. Abdominal surgery was defined as any procedure performed through the abdominal cavity.

Statistical analysis

Descriptive statistics were used to describe the demographic data. Categorical data were compared between the without- and with-complication groups, as well as between the alive and dead groups, using chi-square tests and Fisher's exact tests. Continuous data were analyzed using Wilcoxon rank sum tests. Univariate and multivariate logistic regression analyses were performed to evaluate factors affecting outcomes. Multivariate analysis was performed using a covariate with $P < 0.1$ from univariate and stepwise backward linear regression to select the final model. A P -value < 0.05 was considered statistically significant. All analyses were performed using STATA version 18.

Results

This study included 154 patients with 175 diagnoses. Nineteen patients underwent more than one procedure at a time, resulting in a total of 178 operative interventions. There are 79 males (51.3%), and the majority of the patients were born after 32 weeks (135/154, 90.0%). In addition, 8.5% of patients were born with extremely low birth weight (< 1000 g), whereas 88.9% weighed > 1500 g at birth. Refer to the supplementary materials for detailed data (**Supplementary Table 1**).

Complications occurred in 69 out of 154 patients (44.8%). These complications included wound problems (46.4%), sepsis (21.7%), pneumonia (20.3%), intestinal obstruction (11.6%), anastomosis leakage (7.3%), enterocutaneous and enteroatmospheric fistula (4.4%), intra-abdominal collection (1.5%), and other conditions (24.6%). The majority of these complications were categorized as Clavien-Dindo grade 2, with wound complications accounting for 65% of the cases within this grade. Classification of the complications is shown in **Figure 1**. Regarding

Complications classified according to Clavien-Dindo grade

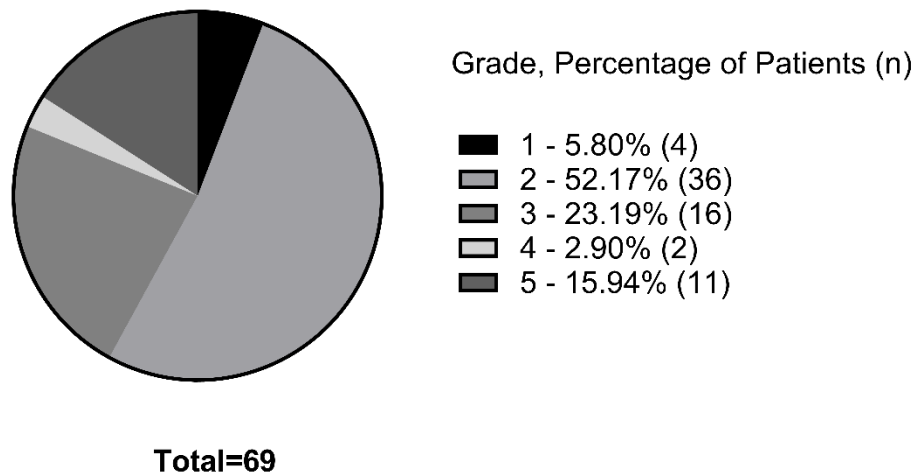


Figure 1. Percentage of patients with complications classified according to Clavien-Dindo classification.

mortality, 12 out of 154 patients (7.8%) died during the same admission. The primary surgical problems of these patients were necrotizing enterocolitis (NEC) (4/12, 33.3%), congenital diaphragmatic hernia (CDH) (3/12, 25%), and single cases of omphalocele, meconium peritonitis, duodenal obstruction, esophageal atresia, and liver tumor. Septicemia was the most common cause of death among these patients (5/12, 41.7%). Other causes of death included other associated anomalies (16.7%), congenital heart diseases (8.3%), hypovolemic shock (8.3%), intraventricular hemorrhage (8.3%), pulmonary hemorrhage (8.3%), and persistent pulmonary hypertension of the newborn (8.3%).

To better understand the complications, we categorized the data into three groups of factors: maternal factors, patient factors, and operative factors.

Maternal factors

Maternal age, mode of delivery, maternal steroid use, pregnancy-related complications, and prenatal diagnosis were collected. Pregnancy-related complications included twin pregnancy, maternal hypertension, maternal hyperthyroidism, pre-eclampsia, premature rupture of the membrane, viral infection, bacterial infection, maternal diabetes, intrauterine growth retardation, and other conditions. We found no significant differences in maternal factors between the with- and without-complication groups or between the alive and dead groups. Detailed data on these maternal factors are provided in **Supplementary Table 2**.

Patient factors

We analyzed patient characteristics, perinatal conditions, diagnoses, initial laboratory results, and inborn or outborn status. Patient characteristics include gender, gestational age, birth weight, and inborn status. Perinatal conditions included APGAR scores at 1 and 5 min (APGAR1 and APGAR5, respectively), RDS, cardiovascular disease, and other associated or syndromic abnormalities. Initial laboratory evaluations included hemoglobin, hematocrit, and platelet count.

Our analysis revealed no significant relationship between outcomes and gender, other associated anomalies, or inborn status. However, APGAR1 ($P = 0.03$), APGAR5 ($P = 0.03$), hemoglobin ($P = 0.03$), and hematocrit ($P = 0.03$) were factors significantly associated with complications. In addition, APGAR scores at 1 and 5 min (APGAR1 $P = 0.001$; APGAR5 $P = 0.01$) and hemoglobin levels ($P = 0.04$) were significantly associated with mortality. Gestational age < 28 weeks ($P = 0.02$), extremely low birth weight ($P = 0.01$), cardiovascular disease ($P = 0.009$), and platelet count ($P < 0.001$) were also found to significantly influence mortality. Detailed data are provided in **Supplementary Table 3**.

In addition, certain diagnoses were also associated with undesirable outcomes. These diagnoses are listed in **Table 1**. Other conditions observed included Meckel's diverticulum, diaphragmatic eventration, hiatal hernia, patent urachus, umbilical vein injury, congenital segmental bowel dilatation, internal hernia, duplication cyst, persistent hyperinsulinemic hypoglycemia in infancy, microcolon, duodenal polyp,

Table 1. Patients' diagnoses.

Factors (diagnosis)	Total (n)	Without-Complications n (%)	With-complications n (%)	P-value	Alive group n (%)	Death group n (%)	P-value
Congenital abdominal wall defect	48	24 (50.0%)	24 (50.0%)	0.27	47 (97.9%)	1 (2.1%)	0.11
Hirschsprung disease, anorectal malformation, and other intestinal obstruction	25	13 (52.0%)	12 (48.0%)	0.62	25 (100.0%)	0 (0.0%)	0.22
Intestinal atresia and stenosis	22	15 (68.2%)	7 (31.8%)	0.23	21 (95.5%)	1 (4.5%)	0.54
NEC and spontaneous intestinal perforation (SIP)	13	7 (53.8%)	6 (46.2%)	0.84	6 (69.2%)	4 (30.8%)	0.01
CDH	10	2 (20.0%)	8 (80.0%)	0.02	7 (70.0%)	3 (30.0%)	0.03
Intestinal perforation and meconium peritonitis	9	5 (55.6%)	4 (44.4%)	0.95	8 (88.9%)	1 (11.1%)	0.53
Tumor (benign and malignant tumor)	8	5 (62.5%)	3 (37.5%)	0.72	7 (87.5%)	1 (12.5%)	0.49
Intestinal malrotation and volvulus	8	6 (75.0%)	2 (25.0%)	0.47	8 (100.0%)	0 (0.0%)	0.40
Esophageal atresia with/without tracheoesophageal fistula	7	2 (28.6%)	5 (71.4%)	0.24	6 (85.7%)	1 (14.3%)	0.44
Hypertrophic pyloric stenosis	3	3 (100.0%)	0 (0.0%)	0.26	3 (100.0%)	0 (0.0%)	0.61
Biliary atresia and choledochal cyst	2	1 (50.0%)	1 (50.0%)	0.85	2 (100.0%)	0 (0.0%)	0.68
Other conditions	17		5 (29.4%)	0.21		0 (0.0%)	0.36

Data presents in median (IQR) and numbers (%). CDH, congenital diaphragmatic hernia; NEC, necrotizing enterocolitis; SIP, spontaneous intestinal perforation.

swallowing dysfunction, inborn error of metabolism, and congenital short bowel syndrome. A total of 175 diagnoses were recorded, as some patients presented with more than one condition. CDH was associated with higher complications (80.0%) and mortality (30.0%), while NEC was significantly associated with high mortality (30.8%).

Operative factors

As shown in **Table 2**, patients' intraoperative status, including body temperature, surgical type, index procedure, operative time, intraoperative blood transfusion, and subsequent operations, was analyzed. Emergency surgery was not significantly associated with the outcomes. However, bowel anastomosis ($P = 0.008$) and requiring a blood transfusion ($P = 0.001$) were significantly associated with complications. No operative factors were associated with mortality.

Subgroup analysis based on specific diagnoses

• **Abdominal wall defect group**

When comparing gastroschisis and omphalocele, there were 19 patients with omphalocele and 24 patients with gastroschisis. In the omphalocele group, one patient died, whereas there were no deaths among patients with gastroschisis. Regarding complications, 9 patients with omphalocele and 11 patients with gastroschisis experienced complications. However, no significant differences were observed in either mortality or complications.

• **Intestinal atresia and stenosis group**

In this study, there were 12 patients with congenital duodenal obstruction and 10 patients with jejunoileal atresia or stenosis. One patient with duodenal atresia died, whereas there were no deaths among the patients with jejunoileal obstruction. A higher rate of adverse outcomes was observed in the jejunoileal group (6/10) compared to the duodenal group (1/12). This result revealed a significant association with complications ($P = 0.02$), but no significant association with mortality.

• **NEC group**

There were 13 patients in this group, with 46.2% (6/13) receiving peritoneal drain placement before exploratory laparotomy. Among patients without drain placement, three of the seven died, compared to one of the six with drain placement; however, this

difference was not significant. Regarding complications, two of the seven patients without a drain and four of the six with a drain experienced complication; however, no significant association was observed.

• **CDH group**

We categorized patients with CDH into two groups, high- and low-risk, based on two predictors: the observed-to-expected lung-to-head ratio for gestational age and the presence of liver herniation. Each group consisted of five patients. In the high-risk group, three out of the five patients died, whereas no deaths occurred in the low-risk group; however, this difference was not significant. Regarding complications, all patients in the high-risk group and three of the five patients in the low-risk group experienced complications, but no significant association was observed.

Length of hospital stay

The length of hospital stay was significantly longer ($P < 0.001$) in patients with complications, with a median of 53 days (interquartile range (IQR): 32–95 days), compared to a median of 26 days (IQR: 16–52 days) in the group without complications. Similarly, a significant difference was observed when comparing mortality: the median length of stay for the alive group was 35.5 days (IQR: 20–78 days), whereas the dead group had a median of 32 days (IQR: 27–96.5 days) ($P < 0.001$).

Multivariate analysis

After individually analyzing all factors, univariate and multivariate analyses were performed to identify significant predictors among the potential variables. As shown in **Table 3**, multivariate analysis revealed that a birth weight $< 1,000$ g ($P = 0.01$), a diagnosis of CDH ($P = 0.04$), and an operative time exceeding 110 min ($P = 0.03$) were significantly associated with complications.

Regarding mortality, significant predictors included birth weight < 1000 g ($P = 0.02$), the presence of congenital heart disease ($P = 0.02$), a platelet count $< 100,000/\mu\text{L}$ ($P = 0.03$), and the diagnosis of CDH ($P = 0.001$), as summarized in **Table 4**.

Table 2. Operative factors.

Factors	Total	With-complication group	Without-complication group	P-value	Alive	Death	P-value
Body temperature (degree Celsius)	36.2 (35.7-36.7)	36.2 (36.0-36.6)	36.3 (35.6-36.7)	0.21	36.1 (35.6-36.5)	35.6 (34.9-37.0)	0.66
Type of surgery							
- Emergency	62 (40.3%)	35 (40.2%)	27 (40.3%)	0.99	58 (40.9%)	4 (33.3%)	0.61
- Elective	92 (59.7%)	52 (59.8%)	40 (59.7%)		84 (59.2%)	8 (66.7%)	
Index procedures							
- Ostomy	50 (32.5%)	26 (29.9%)	24 (35.8%)	0.44	45 (31.7%)	5 (41.7%)	0.48
- Closure abdomen	41 (26.6%)	21 (24.1%)	20 (29.9%)	0.43	40 (28.2%)	1 (8.3%)	0.18
- Bowel anastomosis	25 (16.2%)	20 (23.5%)	5 (7.3%)	0.008	23 (16.2%)	2 (16.7%)	0.97
- Gastrostomy	10 (6.5%)	5 (5.8%)	5 (7.5%)	0.67	9 (6.3%)	1 (8.3%)	0.57
- Primary diaphragmatic repair	8 (5.2%)	1 (1.2%)	7 (10.5%)	0.02	6 (4.2%)	2 (16.7%)	0.12
- Tumor removal	8 (5.2%)	5 (5.8%)	3 (4.5%)	0.73	7 (4.9%)	1 (8.3%)	0.94
- Repair defect with patch	5 (3.3%)	2 (2.3%)	3 (4.5%)	0.65	4 (2.8%)	1 (8.3%)	0.34
- Repair bowel	4 (2.6%)	1 (1.2%)	3 (4.5%)	0.33	3 (2.1%)	1 (8.3%)	0.28
- Ladd procedure	3 (2.0%)	3 (3.5%)	0 (0.0%)	0.26	3 (2.1%)	0 (0.0%)	0.61
- Pull-through procedure	3 (2.0%)	1 (1.2%)	2 (3.0%)	0.58	3 (2.1%)	0 (0.0%)	0.61
- Pyloromyotomy	3 (2.0%)	3 (3.5%)	0 (0.0%)	0.26	3 (2.1%)	0 (0.0%)	0.61
Operative time (min)	110.0 (69.0-165.0)	100.0 (69.0-150.0)	130.0 (75.0-180.0)	0.046	105.0 (65.0-169.0)	120.0 (105.0-140.0)	0.49
Intraoperative blood transfusion	35 (23.0%)	11 (23.0%)	24 (35.3%)	0.001	30 (21.4%)	5 (41.7%)	0.11
Subsequent operations	35 (23.0%)	18 (51.4%)	17 (48.6%)	0.49	32 (91.4%)	3 (8.6%)	1.00

Data presents in median (IQR) and numbers (%).

Table 3. Risk factors associated with complications.

	Univariate		Multivariate	
	OR (95%CI)	P-value	aOR (95%CI)	P-value
Birth weight <1000 g	4.6 (1.2–17.6)	0.02	5.7 (1.5–22.1)	0.01
APGAR at 1 min < 7	2.2 (1.0–4.5)	0.04		
Respiratory distress syndrome	2.1 (0.9–5.0)	0.09		
Hemoglobin < 10	3.8 (0.4–37.6)	0.25		
Hematocrit < 45	1.8 (0.9–3.4)	0.09		
Platelet < 100x10 ³ /mL	6.6 (0.8–57.6)	0.09		
CDH	5.4 (1.1–26.5)	0.04	5.1 (1.1–26.2)	0.04
Primary diaphragmatic repair	3.8 (0.4–37.6)	0.25		
Bowel anastomosis	0.3 (0.1–0.7)	0.01		
Operative time ≥ 110 min	2.2 (1.1–4.1)	0.02	2.1 (1.1–4.1)	0.03
Estimated blood loss ≥ 10 mL	1.6 (0.3–3.0)	0.17		
Intraoperative blood transfusion	3.6 (1.6–8.1)	0.002		

aOR, adjusted odds ratio; CDH, congenital diaphragmatic hernia; OR, odds ratio.

Table 4. Risk factors associated with mortality.

	Univariate		Multivariate	
	OR (95%CI)	P-value	aOR (95%CI)	P-value
GA < 32 weeks	5.95 (1.54–22.94)	0.010		
Birth weight < 1000 g	7.39 (1.86–29.28)	0.004	8.31 (1.52–45.43)	0.02
APGAR at 1 minute < 7	4.81 (1.43–6.19)	0.01		
Cardiovascular diseases	3.35 (1.46–7.69)	0.004	4.21 (1/30–13.64)	0.02
Hemoglobin < 10 g/dL	4.21 (0.40–43.94)	0.23		
Platelet < 100000	15.44 (2.72–87.68)	0.002	12.4 (1.24–123)	0.03
NEC and SIP	7.38 (1.86–29.28)	0.004		
CDH	6.43 (1.42–29.14)	0.02	25 (3.53–177)	0.001
Intraoperative blood transfusion	2.62 (0.78–8.84)	0.12		

aOR, adjusted odds ratio; GA, gestational age, NEC, necrotizing enterocolitis; OR, odds ratio; SIP, spontaneous intestinal perforation.

Discussion

In this study, we analyzed outcomes for 154 neonates undergoing abdominal surgery. Our results showed complication and mortality rates of 44.8% and 7.8%, respectively. The most significant predictors for complications were birth weight <1,000 g, CDH, and operative time > 110 min. Mortality was strongly influenced by birth weight <1000 g, cardiovascular anomalies, CDH, and low platelet count (<100,000/ μ L).

Ninety percent of the pathologies in our study were congenital, with abdominal wall defects being the most common indication, followed by colorectal diseases, intestinal atresia, and NEC. This finding aligns with data from a U.S. study,⁽⁶⁾ in which the repair of abdominal wall defects was the third most common procedure performed in neonates requiring surgery. In that study, pyloromyotomy was the most frequent operation. The lower prevalence of hypertrophic pyloric stenosis in Asian countries may explain the difference in surgical frequency. Some studies^(2, 7, 8) have reported neonatal intestinal obstruction as the

most common congenital condition. The healthcare system, such as the centralization of cases and availability of tertiary care hospitals in that region, may influence this difference. Furthermore, NEC and spontaneous intestinal perforation were the primary findings among the acquired conditions in this study, which is consistent with previous studies.^(1, 7-9)

The overall complication rate was 44.8%, which is quite high but is within the previously reported range (23.0–47.4%).^(9 - 12) Our study found that extremely low birth weight, CDH, and operative time exceeding 110 min were significantly associated with complications in neonatal abdominal surgery. Birth weight <1,000 g was found to increase the likelihood of experiencing complications by 5.68 times. While our literature review did not identify any studies specifically linking extremely low birth weight with increased complications in neonatal abdominal surgery, our findings highlight the specialized healthcare management required for this vulnerable patient population. Regarding diagnoses, CDH was the only condition that was significantly associated with

complications. Most previous studies have primarily focused on outcomes within the context of CDH alone. However, one study⁽⁹⁾ similar to ours examined CDH as an independent factor among various diagnoses in neonatal surgery, thus reinforcing the influence of CDH on complications. In addition, longer operative time is widely recognized as a risk factor for unfavorable outcomes. Similar to previous studies, we identified prolonged operative time as an independent risk factor for surgical site infection in neonates. Our findings highlight the importance of surgeons being mindful of this factor when managing surgical neonates. As wound-related problems accounted for the majority of complications, our results align with previous studies on surgical site infections in neonates.^(13, 14)

The mortality rate in our study was 7.8%, which is lower than that reported in low- to middle-income countries (14.6–35.2%).^(1, 10, 12) Extremely low birth weight, cardiac risks, low platelet count, and CDH were significantly associated with higher mortality rates. Consistent with previous studies,^(8, 11, 15) birth weight and the presence of congenital heart diseases were major factors that influenced mortality in these patients. Thrombocytopenia, or low platelet count, has been widely studied and is known to adversely impact neonatal outcomes, particularly in critically ill or surgical neonates.⁽¹⁶⁻¹⁹⁾ In our study, a low platelet count was significantly associated with higher mortality rates. Severe illness and NEC can lead to thrombocytopenia through different mechanisms. In severe illness, platelets are consumed, which leads to thrombocytopenia, whereas in patients with NEC, the disease triggers an inflammatory response that increases platelet consumption. Thrombocytopenia impairs hemostasis, thrombosis, and immune response, thereby increasing the risk of adverse outcomes. While CDH and NEC are both recognized as significant risk factors for mortality, our multivariate analysis found that only CDH remained a significant predictor of mortality. Interestingly, in the study by Catre, *et al.*⁽⁸⁾ NEC was identified as an independent risk factor for mortality, whereas CDH was not associated with increased mortality, despite the study including a larger cohort of patients with CDH. This finding may suggest variability in how different populations or healthcare settings influence the outcomes of this condition.

In our subgroup analysis, we observed some numerical differences, particularly in conditions such as NEC and CDH. However, only two significant findings were revealed: a higher mortality rate in

patients with CDH with high-risk predictors and a higher complication rate in jejunoileal atresia compared to duodenal obstruction, which aligns with current knowledge. The lack of other significant differences may be attributed to the small sample size.

Surprisingly, our results did not reveal a correlation between gestational age and adverse outcomes, as has been extensively reported in previous studies.^(1, 2, 6, 9, 20) This finding supports birth weight as the best predictor of neonates' health status.^(21, 22) Our study suggests that specialized care is essential for extremely low birth weight neonates. Moreover, implementing a standardized protocol for CDH treatment could improve morbidity and mortality outcomes in our center. Studies from France⁽²³⁾ and the Netherlands⁽²⁴⁾ support this approach, demonstrating that standardized prenatal, fetal, and postnatal care can improve outcomes for patients with CDH. In addition, adopting a multidisciplinary team approach may reduce the operative time, further improving patient outcomes. This coordination effort among surgeons, anesthesiologists, neonatologists, and nursing staff would ensure comprehensive and timely care.

One limitation of this study is its retrospective design, which may result in incomplete data in certain areas. In addition, because it is a single-center study, the findings may not accurately reflect the true prevalence or be generalizable to other hospitals in the country or worldwide. Another limitation is that the study included only patients who underwent surgical procedures, thereby excluding those who died before surgery. This could lead to a lower reported mortality rate in some diagnoses. The relatively small sample size may also have limited our ability to identify some significant factors.

Conclusion

This study provides valuable insights into the factors that influence neonatal abdominal surgery outcomes. Birth weight <1,000 g, CDH, and operative time exceeding 110 min were identified as significant contributors to complications. In addition, birth weight <1,000 g, cardiovascular anomalies, CDH, and a platelet count <100,000/ μ L were strongly associated with increased mortality. These findings highlight the complexity of neonatal abdominal surgery and the importance of understanding these prognostic factors in predicting outcomes. Future improvements in surgical and clinical management strategies could enhance the outcomes for this vulnerable population.

Author contributions

NS and PV contributed substantially to the study's concept and design, data acquisition, literature review, and conducted the analysis and interpretation. KO contributed substantially to data acquisition and analysis. NS and KO contributed to drafting the manuscript. PS, KD, PR, and SR edited the manuscript critically for important intellectual content. All authors approved the final version submitted for publication and take responsibility for statements made in the published article.

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Conflict of interests

The authors declare that the abstract entitled above has been previously presented as an oral presentation at the 38th Annual National (Southern part) Scientific Congress of the Royal College of Surgeons of Thailand (13 to March 16, 2024), held at the Faculty of Medicine, Prince of Songkla University, Songkla, Thailand. The meeting is an annual regional surgical meeting. Only the abstract (not the full manuscript) will be published in the Thai Journal of Surgery in 2024. However, the full manuscript has not been previously considered or published in any other journals.

Data sharing statement

All data generated or analyzed in the present study are included in the published article. Further details are available for non-commercial purposes from the corresponding author upon reasonable request.

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