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ORIGINAL ARTICLE

Prevalence and mortality factors in initial hospitalization for gastroschisis

Prevalencia y factores de mortalidad en la hospitalización inicial por gastrosquisis

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What do we know about the subject matter of this study?

Gastroschisis is a congenital malformation of the abdominal wall, with a good prognosis in developed countries due to adequate infrastructure and optimal management. However, there is still a lack of information on the magnitude and impact of this condition.

What does this study contribute to what is already known?

This study identifies factors associated with neonatal mortality due to gastroschisis in a referral hospital in Ecuador, providing key information to optimize its management and improve clinical outcomes.

Abstract

Gastroschisis is a congenital defect characterized by the protrusion of abdominal viscera through a paraumbilical opening. **Objective:** To determine the frequency of gastroschisis and describe variables associated with neonatal mortality. **Patients and Method:** A cross-sectional study based on data from the Perinatal Information System of the *Hospital Gineco Obstétrico Isidro Ayora* (2008–2022). Sociodemographic, obstetric, and neonatal variables were analyzed using Bayesian tests for contingency tables, logistic regression, and the Bayesian t-test analog. **Results:** A total of 175 neonates were included (58.9% female). The frequency of gastroschisis was 0.13% (95% CI: 0.11–0.15), with a mortality rate of 22.8%. There was a negative association with gestational age (OR: 0.65; 95% CI: 0.49–0.85) and calendar year (OR: 0.79; 95% CI: 0.68–0.91), indicating lower mortality with each additional week of gestation and over time. The presence of ≥ 2 complications (OR: 3.46; 95% CI: 1.30–7.12) and Apgar score < 7 at five minutes (OR: 3.12; 95% CI: 1.01–60.91) were positively associated with mortality.

Keywords:
Gastroschisis;
Congenital Anomalies;
Newborn;
Clinical Epidemiology;
Survival;
Infant Mortality

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Deceased neonates had lower birth weight (2,003.6g versus 2,316.7g; $BF_{10} = 35.2$) and shorter hospital stay (20.9 days versus 34.5 days; $BF_{10} = 204$). **Conclusions:** Gastroschisis showed a high frequency, with mortality associated with multiple complications, low Apgar scores, and low birth weight, while higher gestational age and advances in clinical management over the years were associated with a lower fatal risk. The need for a multidisciplinary approach to improve neonatal outcomes in this population is emphasized.

Introduction

Gastroschisis was first described in 1733, together with omphalocele, and is one of the main malformations of the abdominal wall[1]. This major congenital defect is characterized by protrusion of the abdominal viscera through an orifice, mostly to the right of the umbilicus. Gastroschisis is a congenital condition that occurs more frequently in neonates born to young mothers and whose incidence has been increasing, especially in developed countries[2]. During fetal development, the intestine and other abdominal organs remain exposed to amniotic fluid. Prenatal factors, such as episodes of fetal ischemia and alterations in fetal heart rate, may predispose to intestinal damage. Following birth, inadequate protection of the intestinal loops by failing to apply a sterile bag, as well as vascular compromise due to mesenteric torsion or traction against the edge of the abdominal defect, are additional factors that may aggravate the damage. These postnatal alterations usually manifest as intestinal wall thickening, edema, and lining by fibrinous exudate, which can negatively influence the clinical evolution of the patient[2].

Most cases of gastroschisis are characterized by evisceration of the small intestine and sometimes the colon, with liver involvement being rare. Defects located to the left of the umbilicus are usually associated with a poorer prognosis and a higher frequency of concomitant anomalies, including intestinal atresia, situs inversus, heart defects, cerebral arteriovenous malformations, macrocephaly, and scoliosis[3].

Complex gastroschisis is defined by the presence of at least one additional intestinal pathology, such as atresia, perforation, segmental necrosis, or volvulus, associated with increased morbidity and mortality, as well as longer hospitalizations. In contrast, simple gastroschisis is characterized by the absence of these additional intestinal complications[4,5].

In Ecuador, there is little information on the prevalence of gastroschisis and the perinatal factors that impact neonatal mortality. For this reason, it is essential to investigate and understand the factors that affect these outcomes. The objective of this study is to determine the frequency of gastroschisis in neonates seen at the *Hospital Gineco-Obstétrico Isidro Ayora* (HGOIA) and to describe the variables associated with mortality during their neonatal hospitalization.

Patients and Method

Study design and sample

Cross-sectional study based on secondary data obtained from the Perinatal Information System (SIP) of neonates with gastroschisis born between January 2008 and December 2022, seen at the HGOIA, a tertiary-level hospital specialized in congenital malformations. The hospital, located in Quito, Ecuador (highlands region) at 2850 meters above sea level, is part of the National Public Health System. The data were recorded in the SIP at discharge from the hospital during the neonatal stage.

Procedure

To identify newborns with gastroschisis, the HGOIA SIP records were used, selecting those classified under SIP code 146. The inclusion criteria considered live neonates with a confirmed diagnosis of gastroschisis during neonatal hospitalization, while those transferred to other institutions before completing their care and cases with incomplete records were excluded.

Maternal sociodemographic variables were collected (age, schooling, ethnicity, region of residence), obstetric history (number of previous pregnancies), risk factors during pregnancy (alcohol consumption, tobacco exposure, anemia, hypertensive disorders, ovarian and urinary tract infection, and number of prenatal check-ups), and the route of delivery (vaginal or cesarean section). The neonatal characteristics evaluated included: multiple pregnancy, prematurity, weight for gestational age, Apgar score at one and five minutes, sex of the newborn, number of complications (infectious, respiratory, metabolic, hemorrhagic and surgical, such as intestinal obstruction or necrotizing enterocolitis), congenital malformations (gastrointestinal, renal, neurological, cardiac and genetic, such as Down syndrome), and hospital stay. No record of left defect was found.

Weight for gestational age was classified using the Fenton growth calculator into three categories: low weight for gestational age (< p10), adequate (p10-p90), and large for gestational age (> p90)[6]. Prematurity was classified according to WHO criteria as neonates with gestational age < 37 weeks, subdivided into extremely preterm (< 28 weeks), very preterm (28 to 31^{+6} weeks), moderate preterm (32 to 33^{+6} weeks), and late preterm (34 to 36^{+6} weeks). Any neonate born at ≥ 42 weeks of gestation was considered postmature. Other variables were grouped into dichotomous or polytomous categories, as appropriate (Apgar: < 7 versus ≥ 7; number of complications, number of prenatal check-ups: 0.1 to 4.5 to 7, > 8).

The care of neonates with gastroschisis was performed according to institutional protocol, including initial stabilization by hemodynamic and temperature support, sterile coverage of exposed viscera, ventilatory support according to the patient's needs, and surgical repair adjusted to their clinical condition. All patients received total parenteral nutrition through central venous access, guaranteeing comprehensive management in the postoperative stage.

Statistical analysis

The analysis was performed using a Bayesian approach due to its flexibility and robustness against the limitations of frequentist methods, especially in contexts of small sample sizes, infrequent events, absence of normality, or presence of outliers[7,8]. This approach allowed a more accurate estimation of uncertainty and is particularly suitable for the study of low-prevalence diseases.

Categorical variables were described as absolute and relative frequencies, and their associations with neonatal mortality were assessed by Bayesian tests applied to contingency tables. For bi- and multivariate analysis, Bayesian logistic regression models were used, obtaining crude and adjusted odds ratios (OR), together with their respective 95% credible intervals (95%CI). The selection of categorical variables in the multiple model was based on the evidence provided by the Bayes Factor (BF_{10}), including those with values > 1. To estimate their effect on the probability of death, the continuous variables calendar year and gestational age in weeks were also included in the model.

The continuous numerical variables (birth weight and days of hospitalization) were analyzed using Bayesian t-tests for independent samples.

Non-informative priors (standard Cauchy distribution) were used in all analyses, and an MCMC algorithm with 10,000 iterations was implemented to approximate posterior distributions. Results were expressed as medians, interquartile ranges (IQR), 95%CI, OR (95% CI), and BF_{10}.

The interpretation criteria for the BF_{10} were as follows

BF_{10} < 1: evidence in favor of the null model.

BF_{10} between 1 and 3: anecdotal evidence in favor of the alternative hypothesis.

BF_{10} between 3 and 10: moderate evidence.

BF_{10} > 10: strong to very strong evidence in favor of the alternative hypothesis.

All analyses were performed using the JASP software (v0.16.4)[9].

Ethical aspects

The study was approved by the Human Research Ethics Committee of the *Universidad Central de Ecuador* (CEISH-UCE), code: 009-DOC-FCM-2023. This study did not require informed consent since the HGOIA provided a previously anonymized database.

Results

Between January 2008 and December 2022, 142,794 births were registered in the HGOIA, of which 2.15% (95%CI 2.08-2.23) presented congenital defects. Of these, 183 cases (0.13%; 95%CI 0.11-0.15) corresponded to gastroschisis. Eight cases were excluded due to transfers, so the final analysis included 175 neonates.

Table 1 summarizes the main characteristics of the population studied. The percentage of deaths was 22.8% (n = 40).

Table 1. Demographic and clinical characteristics of neonates with gastroschisis and their mothers at Hospital Gineco Obstétrico Isidro Ayora (2008-2022) (n = 175)

Demographic and clinical characteristics	Frequency or median
Maternal characteristics	
Ethnicity: mestizo, n (%)	170 (97.1)
Residence in Sierra region, n (%)	149 (85.1)
Stable partner, n (%)	139 (79.4)
Pregnancy and delivery characteristics	
Multiple pregnancy, n (%)	7 (4)
Vaginal delivery, n (%)	26 (14.8)
Neonatal characteristics	
Birth weight (grams), median (IQR)	2240 (1930-2526)
Female sex, n (%)	106 (60.5)
Prematurity, n (%)	93 (53.1)
Small for gestational age, n (%)	81 (46.2)
Apgar score < 7 at 1 minute, n (%)	35 (20)
Apgar score < 7 at 5 minutes, n (%)	6 (3.4)
Neonates with at least one complication, n (%)	144 (82.2)
Associated congenital defects, n (%)	28 (16)
Hospital length of stay (days), median (IQR)	27 (12-37)

IQR: Interquartile range (p25-p75)

Perinatal Factors and Clinical Course

Regarding maternal variables among the groups of newborns who were discharged alive and those who died, only alcohol consumption during pregnancy was found to be associated (table 2).

Table 3 shows the neonatal characteristics according to survival. Of the cases, 14.9% (n = 26) had complex gastroschisis, with no significant association with mortality (BF_{10} = 0.39). However, an Apgar score < 7 at five minutes and the presence of other congenital defects showed significant differences between surviving and deceased neonates.

In relation to gestational age, no cases of postmature neonates were observed. Among the patients with more than 39 weeks of gestation, only one death was reported.

When the patients were analyzed according to their weight for gestational age, there was no difference between the groups (BF_{10} = 0.11). However, neonates who died had a median of 2,003.6 grams (IQR 1,630-2,355), while survivors reached 2,316.7 grams (IQR 2,005-2,620) (BF_{10} = 35).

The median length of hospital stay was 20.8 days in deceased patients (IQR 3-38), compared to 34.6 days in patients who were discharged alive (IQR 23-37) (BF_{10} = 204). In addition, 9 of the deaths (22.5%) occurred within the first 48 hours of hospitalization, of which 6 were preterm infants.

Complications and Factors Associated with Mortality

Supplementary table 1 (available online) shows the comparison of the types of congenital defects between live and deceased neonates.

Table 4 presents the statistical comparison of the most frequent complications in neonates with gastroschisis. Some serious complications, such as bleeding diathesis, disseminated intravascular coagulation (DIC), pulmonary hemorrhage, intestinal perforation, and heart failure, occurred exclusively in neonates who died; therefore, they were not included in the table.

Regression Models and Inferential Analysis

Table 5 presents a comparative analysis between simple and multiple logistic regression with Bayes factors (BF_{10}) to evaluate predictors of mortality. The gestational age of the NB is the most consistent protective factor, with each additional week reducing mortality. Likewise, each calendar year elapsed suggests improved survival. Two or more complications show moderate evidence for increased risk of death. The remaining predictors show anecdotal evidence or evidence in favor of the null hypothesis.

In figure 1, panels A and B respectively illustrate the median comparison of birth weight and length of hospital stay. Under the subheadings "dies" and "alive", the corresponding median value is presented, together with its 95%CI. In addition, next to the box plots, the sequential analysis detailing the BF_{10} and the strength of evidence in favor of the alternative hypothesis is included.

Supplementary Figure 1 (available online) presents the hierarchy of variables associated with neonatal mortality in cases of gastroschisis. The statistically relevant variables in the model were: gestational age, calendar year, and the presence of two or more complications.

Discussion

This study identified that 0.13% of births in the HGOIA corresponded to cases of gastroschisis, with 22.8% of mortality during neonatal hospitalization. These results can be attributed to HGOIA's status as a national referral institution. In comparison, in the United States, the relative frequency is 0.031% (3.1 per 10,000 pregnancies)[10]. In sub-Saharan Africa, frequencies vary between 0.0026% and 0.0175% (0.26 to 1.75 per 10,000 live births)[11]. In Mexico, frequencies of 0.0271% and 0.019% are reported in regions of low and moderate altitude, respectively[12].

Mortality observed in our study was 22.8%, significantly higher than that reported in developed countries, where rates vary between 4% and 7%[13]. In the United States, this figure has remained around 5.9%[14]. Accordingly, a systematic review estimated an overall survival rate of 91.3%, highlighting the impact of current management strategies[15]. However, multivariate analysis evidenced a negative association between neonatal mortality and calendar year, suggesting a favorable trend in clinical outcomes over time, probably attributable to advances in medical and technological management of the pathology[14,15].

Although patient care was carried out according to institutional protocol guidelines, the high mortality observed in this study was associated with prematurity, low birth weight, Apgar score < 7 at five minutes, and the presence of multiple complications. Severe complications such as hemorrhagic diathesis, DIC, pulmonary hemorrhage, intestinal perforation, and heart failure only occurred in neonates who died. These conditions, due to their severity and complexity, could have conditioned this outcome and are considered indicators of unfavorable prognosis in neonates hospitalized in neonatal intensive care units[13,16].

Table 2. Neonatal survival in gastroschisis: sociodemographic, pregnancy and delivery factors at Hospital Gineco Obstétrico Isidro Ayora (2008-2022) (n=175)

Sociodemographic characteristics and pregnancy/delivery conditions	Alive	Deceased	BF_{10}*
	n = 135	n = 40	
Maternal age, n (%)			0.06
< 20 years	56 (41.5)	13 (32.5)	
20 to 29 years	64 (47.4)	24 (60)	
30 to 39 years	14 (10.4)	3 (7.5)	
≥ 40 years	1 (0.7)	0 (0)	
Educational level, n (%)			0.04
None	1 (0.7)	0	
Primary	26 (19.3)	7 (17.5)	
Secondary	94 (69.6)	28 (70)	
Higher education	14 (10.4)	5 (12.5)	
Ethnicity, n (%)			0.35
Mestizo	131 (97.1)	39 (97.5)	
Indigenous	1 (0.7)	1 (2.5)	
Afrodescendant	2 (1.5)	0	
Other	1 (0.7)	0	
Region, n (%)			0.73
Sierra	110 (81.5)	29 (72.5)	
Coast	14 (10.4)	10 (25)	
Amazon	10 (7.4)	1 (2.5)	
Insular	1 (0.7)	0	
Previous pregnancies, n (%)			0.48
None	76 (56.3)	19 (47.5)	
1 to 3	57 (42.2)	18 (45)	
≥ 4	2 (1.5)	3 (7.5)	
Alcohol consumption during pregnancy, n (%)			2.13
Yes	7 (5.2)	6 (15)	
No	128 (94.8)	34 (85)	
Tobacco exposure during pregnancy, n (%)			0.30
Yes	11 (8.1)	4 (10)	
No	124 (91.9)	36 (90)	
Maternal anemia, n (%)			0.30
Yes	11 (8.1)	4 (10)	
No	124 (91.9)	36 (90)	
Gestational hypertensive disorder, n (%)			0.56
Yes	3 (2.2)	0	
No	132 (97.8)	40 (100)	
Chorioamnionitis, n (%)			0.35
Yes	18 (13.3)	3 (7.5)	
No	117 (86.7)	37 (92.5)	
Urinary tract infection, n (%)			0.31
Yes	70 (51.9)	25 (62.5)	
No	65 (48.1)	15 (37.5)	
Number of prenatal care visits, n (%)			0.02
0	7 (5.2)	1 (2.5)	
1 to 4	27 (20)	8 (20)	
5 to 7	62 (45.9)	18 (45)	
≥ 8	39 (28.9)	13 (32.5)	
Mode of delivery, n (%)			0.26
Vaginal	19 (14.1)	7 (17.5)	
Cesarean section	116 (85.9)	33 (82.5)	

*BF_{10}: Bayes Factor in favor of H1.

Table 3. Neonatal characteristics of patients with gastroschisis according to survival at Hospital Gineco Obstétrico Isidro Ayora (2008-2022) (n = 175)

Characteristics of neonates with gas-troschisis	Alive N = 135	Deceased N = 40	BF_{10}*
Neonatal sex, n (%)			0.37
Female	83 (61.5)	20 (50)	
Male	52 (38.5)	20 (50)	
Gestational age, n (%)			0.17
Extremely preterm	2 (1.5)	2 (5)	
Very preterm, moderate and late preterm	69(51.1)	20 (50)	
Term	64 (47.4)	18 (45)	
Weight for gestational age, n (%)			0.11
Small for gestational age	63 (46.7)	18 (45)	
Appropriate for gestational age	71 (52.6)	22 (55)	
Large for gestational age	1 (0.7)	0	
Apgar score < 7 at 1 minute, n (%)			0.49
Yes	24 (17.8)	11 (27.5)	
No	111 (82.2)	29 (72.5)	
Apgar score < 7 at 5 minutes, n (%)			6.55
Yes	2 (1.5)	4 (10)	
No	133 (98.5)	36 (90)	
Multiple pregnancy, n (%)			
Yes	6 (4.4)	1 (2.5)	0.38
No	129 (95.6)	39 (97.5)	
Presence of other congenital defect, n (%)			2.35
Yes	17 (12.6)	11 (27.5)	
No	118 (87.4)	29 (72.5)	
Complex gastroschisis, n (%)			0.39
Yes	18(13.3)	8 (20)	
No	117 (86.7)	32 (80)	

*BF_{10} : Bayes Factor in favor of H1.

Mortality remains high in low- and middle-income countries. Reported rates include 62.4% in Sub-Saharan Africa[11], 78.8% in Jamaica[17], and a survival rate of only 5% in Mozambique[18]. In Rwanda, mortality reached 77%[19], while in Brazil it was documented at 33.2%[20], and in Colombia at 13%[21]. These results highlight the need to implement early management strategies and improve the quality of care in resource-limited settings.

Given that the HGOIA is a tertiary-level hospital, it is relevant to compare these findings with studies that examine mortality across different types of hospitals. It has been identified that the risk of mortality is 7.5 times higher in general hospitals and 3.2 times higher in specialized hospitals, compared to newborns without this pathology[22].

In relation to prematurity, although no significant association with mortality was observed when classifying by subgroups (extreme, moderate, and late preterm), multivariate analysis showed that each additional week of gestational age was associated with a significant reduction in the risk of death. Available evidence suggests that delivery between 37 and 38 weeks of gestation is associated with a lower risk of complications such as necrotizing enterocolitis and earlier initiation of feeding. In contrast, birth after 39 weeks has been linked to an increased risk of intestinal inflammation, ischemia, and higher mortality[22-25]. Furthermore, it is recommended to adapt the type of delivery to the individual needs of each case, reserving cesarean section for specific indications[2,24,25].

The results also showed that neonates who died had a significantly lower birth weight, which is consistent with other studies in which birth weight was lower in neonates with gastroschisis who did not survive[14,26]. In this context, prematurity appears to be a

Table 4. Neonatal complications in patients with gastroschisis according to survival at Hospital Gineco Obstétrico Isidro Ayora (2008-2022) (n = 175)

Complications in neonates with gastroschisis	Alive N = 135	Deceased N = 40	BF_{10}*
Infection, n (%)			1,22
Yes	63 (46,7)	26 (65)	
No	72 (53,3)	14 (35)	
Necrotizing enterocolitis, n (%)			0,61
Yes	12 (8,9)	1 (2,5)	
No	123 (91,1)	39 (97,5)	
Respiratory distress, n (%)			0,35
Yes	14 (10,4)	6 (15)	
No	121 (89,6)	34 (85)	
Birth asphyxia, n (%)			0,33
Yes	7 (5,2)	2 (5)	
No	128 (94,8)	38 (95)	
Transient tachypnea of the newborn, n (%)			0,40
Yes	8 (5,9)	1 (2,5)	
No	127 (94,1)	39 (97,5)	
Cholestasis, n (%)			0,97
Yes	8 (5,9)	0	
No	127 (94,1)	40 (100)	
Acidosis, n (%)			0,48
Yes	3 (2,2)	1 (2,5)	
No	132 (97,8)	39 (97,5)	
Non-traumatic intraventricular hemorrhage, n (%)			1,09
Yes	2 (1,4%)	2 (5%)	
No	133 (98,5%)	38 (95%)	
Seizures, n (%)			0,61
Yes	2 (1,4)	1 (2,5)	
No	133 (98,6)	39 (97,5)	
Acute kidney injury, n (%)			0,61
Yes	2 (1,4)	1 (2,5)	
No	133 (98,6)	39 (97,5)	
Pneumothorax, n (%)			0.61
Yes	2 (1,4)	1 (2,5)	
No	133 (98,6)	39 (97,5)	
Pneumomediastinum, n (%)			0,61
Yes	2 (1,4)	1 (2,5)	
No	133 (98,6)	39 (97,5)	
Intestinal obstruction, n (%)			0 ,95
Yes	1 (0,7)	1 (2,5)	
No	134 (99,3)	39 (97,5)	
Number of neonatal complications, n (%)			1,55
None	27 (20)	4 (10)	
One	43 (31,9)	22 (55)	
Two	44 (32,6)	13 (32,5)	
Three	21 (15,5)	1 (2,5)	

BF_{10}: Factor Bayes a favor de H1.

Table 5. Variables associated with neonatal mortality in patients with gastroschisis during initial hospitalization at Hospital Gineco Obstétrico Isidro Ayora (2008-2022)

Variables associated with mortality in neonates with gastroschisis	Simple logistic regression			Multiple logistic regression		
	OR	CI (95%)	BF_{10}*	OR	CI (95%)	BF_{10}*
Gestational age	0.82	(0.68;1.00)	35.53	0.65	(0.49;0.85)	51.34
Calendar year	0.85	(0.75;0.96)	48.19	0.79	(0.68;0.91)	20.89
Two or more complications	1.54	(1.00;4.06)	0.99	3.46	(1.30; 7.12)	4.64
Apgar score < 7 at 5 minutes	2.91	(1.00;24.76)	1.15	3.12	(1.01;60.91)	1.05
Alcohol consumption during pregnancy	1.42	(0.99;6.23)	0.49	1.56	(1.00;9.58)	0.43
Neonatal infection	1.33	(1.00;3.34)	0.62	1.49	(0.98;3.59)	0.35
Presence of other congenital defect	1.52	(1.00;4.57)	0.76	1.05	(0.97;2.72)	0.16
Non-traumatic intraventricular hemorrhage	1.76	(0.98;5.86)	0.15	0.99	(0.39;2.25)	0.14

*BF_{10} *: Factor Bayes a favor de H1.*

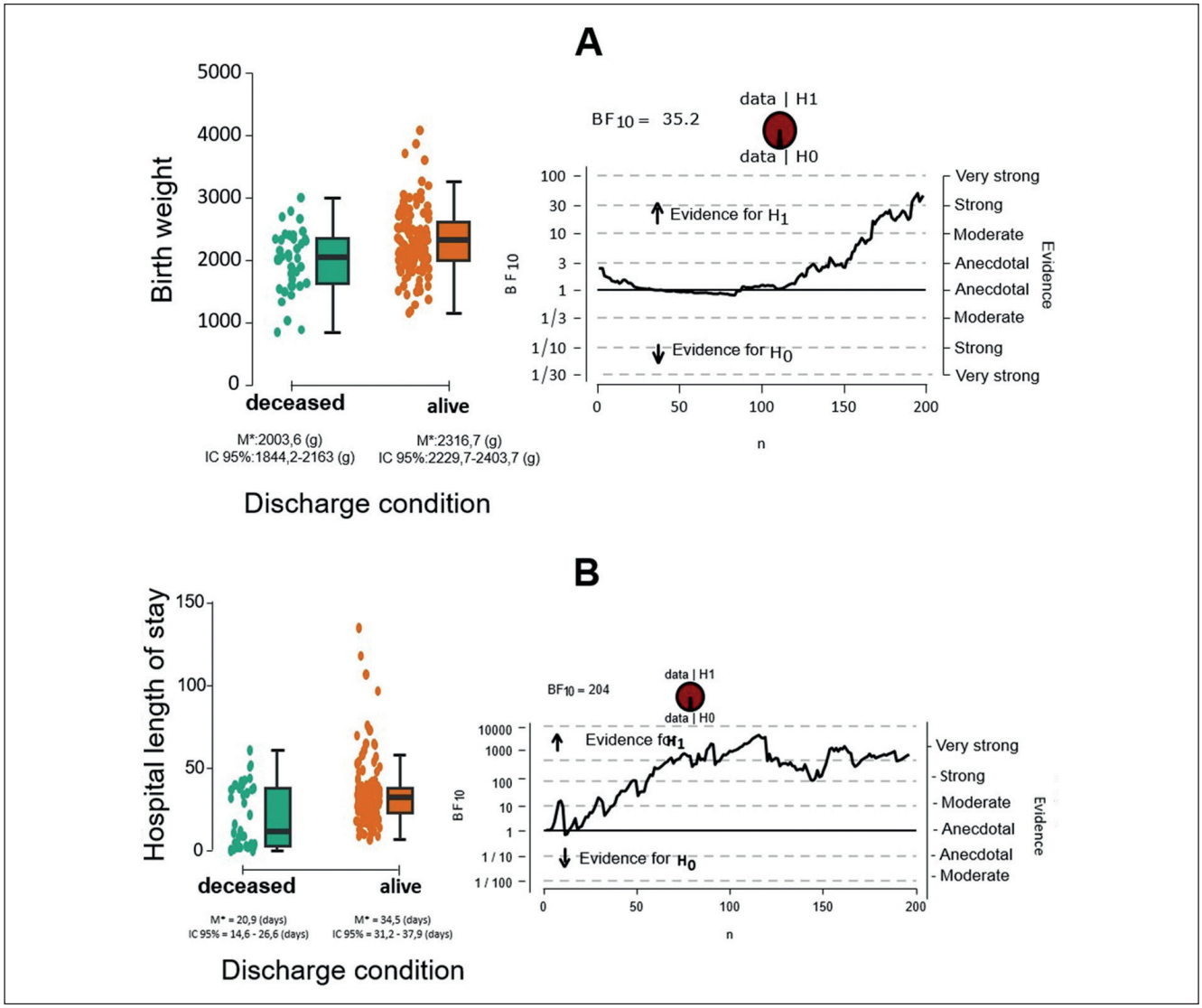

Figure 1. Bayesian t-tests for birth weight and hospital length of stay according to discharge outcome. (A) Comparison of birth weight between deceased and surviving neonates, (B) Comparison of hospital length of stay between the same groups. M* = Median; BF10 = Bayes Factor; H0 = null hypothesis; H1 = alternative hypothesis; The scattered points adjacent to each box plot correspond to the original data distribution.

key factor, as preterm neonates have a lower birth weight due to a shorter gestational time[22,25], suggesting that birth weight, although relevant, could be more a reflection of the prematurity condition than an independent determinant of mortality in these patients.

Likewise, this study showed that an Apgar score < 7 at five minutes increases the risk of mortality in newborns with gastroschisis. This is consistent with a previous study that has identified Apgar score at 5 minutes and the presence of complex gastroschisis as predictors of mortality[3]. These results highlight Apgar score assessment as an early indicator of clinical deterioration, useful for guiding timely interventions at birth.

Regarding complications, infection was one of the most frequent, present in 46.7% of the surviving neonates and in 65% of those who died, suggesting a considerable impact on adverse outcomes. These results contrast with reports from Nigeria, where 100% of neonates with gastroschisis developed sepsis and 78.6% died[27]. Prolonged exposure of viscera to the external environment, combined with the use of prolonged parenteral nutrition and the performance of surgical procedures, could explain these high infection rates[25,28]. Infection control strategies need to be strengthened in these patients, including standardized surgical protocols, early monitoring for signs of infection, and appropriate antibiotic management.

In this study, alcohol consumption during pregnancy showed an anecdotal association with mortality; however, this habit has been reported to be associated with both an increased risk of gastroschisis and increased neonatal mortality. This background suggests that the impact of maternal alcohol consumption should be further analyzed in future research[29,30].

14.8% of the cases in this study presented complex gastroschisis, which is similar to that reported in other investigations, with a reported frequency of 13.6%[13]. However, in the group evaluated in this study, a significant relationship between complex gastroschisis and mortality was not identified, in contrast to other studies that have documented a higher risk of mortality in these cases[4,22].

In addition, 16% of the neonates presented at least one additional congenital defect. Although the coexistence of congenital malformations is a frequent finding in patients with omphalocele, in gastroschisis, its frequency varies. It has been reported that approximately 25% of patients with gastroschisis have gastrointestinal malformations, and 10% show anomalies in other systems[31]. In Sweden, a prevalence of associated defects of 32% has been described, with gastrointestinal (11.4%), musculoskeletal (9.8%), and cardiovascular (7.9%) anomalies predominating[32]. However, in this study, the presence of other congenital malformations was not associated with increased mortality. This contrasts with previous studies that have identified these anomalies as a significant predictor of mortality in neonates with gastroschisis[14].

Although no significant differences in the type of complications were found between the surviving and deceased groups, the presence of two or more complications showed a significant association with an increased risk of mortality. The accumulation of complications constitutes a critical factor that aggravates the clinical condition of neonates with gastroschisis, increasing the likelihood of fatal outcomes[16,33,34].

It was observed that neonates with gastroschisis who survived had a longer hospital stay. Of the total number of patients who died, 22.8% died during the first 48 hours of hospitalization, and most of them were premature, highlighting the impact of complications such as prematurity on mortality[19]. In addition, it has been reported that the mean duration of hospitalization is longer in cases of complex gastroschisis[15]. This delay in hospital discharge is attributed to complications inherent to the malformation and to those arising during hospitalization, such as infections, which also increase the costs of care[13,16].

The strength of the study is based on the temporal extension of the study, which covered 14 years and included in the analysis the temporal trend of the fatal outcome, in addition to the size of the sample analyzed. Although retrospective analysis of a secondary database could lead to information biases, and the SIP has limitations in the collection of data on surgical techniques and specific nutritional regimens, the study documents surgical and clinical complications during hospitalization, allowing an adequate assessment of their influence on patient survival.

Conclusions

This research provides specific data that may help to optimize the management and prognosis of gastroschisis in a setting with limited epidemiologic information. Gastroschisis showed a high frequency in this referral hospital, with prematurity, presence of two or more complications, and low Apgar score at 5 minutes as variables associated with mortality. In addition, the neonates who died had significantly lower birth weights; those who survived, on the other hand, required prolonged hospital stays, reflecting differences in the clinical severity of their initial pathologies.

Prospective studies, preferably multicenter, are recommended to confirm the causal relationship between the risk factors identified and to further analyze other potentially relevant variables.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: This study was approved by the respective Research Ethics Committee. The authors state that the information has been obtained anonymously from previous data.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

Financial Disclosure

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