

Research Article

Challenges of Perioperative Management and Outcome of Neonates with Gastroschisis in a Tertiary Hospital in Southern Nigeria

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Abstract

Gastroschisis is a congenital full thickness anterior abdominal wall defect with exposure of intraabdominal content of varying degree and affected neonates are at risk of fluid loss, sepsis, hypothermia, and metabolic derangements. Perioperative management plays a pivotal role in stabilizing these newborns and influences better clinical outcome. The aim of this 3-year retrospective study was to assess the relationship between the age at presentation, type of anaesthesia rendered and outcomes recorded among neonates diagnosed with gastroschisis as well as to highlight the challenges associated with the perioperative management. Methods: This study is a three-year retrospective review (2023-2025) of neonates with gastroschisis managed at the University of Benin Teaching Hospital (UBTH). Hospital records of neonates with gastroschisis who underwent surgical repair within the study period were retrieved. Data extracted were demographic characteristics, clinical diagnosis, surgical procedures, anesthetic technique, length of hospital stay and outcome. Results: Nine cases were reviewed, 5 Females (55.6%) and 4 males (44.4%). The age at presentation ranged from 2 hours to 48hours. Isolated gastroschisis alone accounted for 77.8% of cases, while gastroschisis with intestinal atresia and gastroschisis with gangrenous bowel accounted for 11.1% respectively. General anesthesia was used for all patients. Length of postoperative hospital stay ranged from 3 to 16 days. Mortality was recorded in all patients, with highest number of mortality (33.3%) on the 10th day on admission. Conclusion: We therefore emphasize the high rate of mortality among patients with gastroschisis and highlight the need for adequate perioperative management of neonates with gastroschisis.

Keywords

Gastroschisis, Management, Outcome, Perioperative

1. Introduction

Gastroschisis is a congenital full thickness defect of the anterior abdominal wall typically the right of the umbilicus characterized by herniation of abdominal contents. Outcomes depend not only on surgical technique but also on the quality of

perioperative and anesthetic care [1, 2, 8, 16].

Gastroschisis has been reported more frequently among infants born to young mothers, particularly those under 20 years of age [3]. Most affected infants are born preterm and with

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low birth weight, which further complicates perioperative management [4]. Common associated problems include dehydration, electrolyte imbalance, hypothermia, and sepsis [1]. Low- and middle-income countries report delayed presentation and poor preoperative condition as important contributors to mortality [4, 5]. Neonatal surgery is a complex and time-sensitive, with a narrow margin for error while Neonatal surgical conditions accounts for approximately 11% of the global disease burden [15].

General anesthesia with endotracheal intubation remains the standard technique for surgical repair of gastroschisis. Induction is often challenging because these neonates are physiologically immature and may already be hypothermic or septic. Inhalational induction using agents such as sevoflurane is commonly reported, although intravenous induction may be used when venous access is secured [6]. Opioids, including fentanyl or morphine, are administered for analgesia, while careful titration is required to avoid respiratory depression intraoperatively and postoperatively [7]. Maintenance of anesthesia usually involves a combination of volatile agents and oxygen-air mixtures, with close monitoring of oxygen saturation, heart rate, blood pressure, and temperature.

Large insensible fluid losses occur from exposed bowel surfaces, and aggressive fluid replacement is often required. Crystalloids such as normal saline or Ringer's lactate are commonly used, while glucose-containing solutions are added to prevent hypoglycemia [2]. Blood transfusion may be required in cases with significant blood loss or preexisting anemia. Increased intra-abdominal pressure following primary closure can impair venous return and lung expansion, leading to respiratory and cardiovascular instability [1]. These risks have led to the adoption of staged closure using silos in selected cases, which reduces sudden increases in abdominal pressure, which would contribute to decrease in perfusion of the wall of the hollow organ, thus increases edema leading to the development of compartment syndrome that can result in substantial loss of bowel length [9, 10].

Neonates often require postoperative mechanical ventilation and admission to a neonatal intensive care unit, which is readily not available in low/middle income countries like Nigeria. Infection remains a major cause of mortality, especially in settings where sterile handling and intensive monitoring are limited [5].

Short-term outcomes in gastroschisis are usually measured by survival to discharge, length of hospital stay, and time to

full enteral feeding. In high-income countries, survival rates now exceed 90 percent due to improved neonatal anesthesia and intensive care [1]. However, reports from sub-Saharan Africa show significantly lower survival, often below 50 percent, reflecting late presentation, limited neonatal intensive care facilities, and shortages of trained personnel [4, 11].

Length of hospital stay varies widely, depending on bowel condition, presence of complications, and postoperative support. Neonates with simple isolated gastroschisis generally recover faster than those with associated intestinal atresia or bowel gangrene [2].

The role of anesthesia in determining outcomes has been increasingly recognized as careful airway management, appropriate fluid therapy, and effective temperature regulation are associated with improved survival and fewer complications [7]. Inadequate perioperative resuscitation has been linked to higher rates of postoperative sepsis and respiratory failure [6].

Anesthetic techniques that minimize physiological stress, such as gentle ventilation strategies and staged abdominal closure, have been associated with better hemodynamic stability and improved outcomes. Furthermore, early postoperative analgesia and ventilatory support reduce stress responses and facilitate recovery [2].

Most published African studies focus on surgical results rather than anesthetic variables, creating a gap in knowledge that this study seeks to address [4, 5].

2. Method

This is a retrospective descriptive study carried out at the University of Benin Teaching Hospital (UBTH) between 2023-2025. Case notes of all neonates with clinical diagnosis of gastroschisis, who underwent surgical repair under anesthesia at UBTH within the study period, were retrieved. Neonates with incomplete medical records documenting anesthetic management and postoperative outcomes and those who died before surgical intervention were excluded.

Data were collected using a structured proforma. Data includes; Demographic and clinical characteristics: Perioperative management, surgical procedure (primary closure or staged repair), anaesthetic technique, length of hospital stay, while survival or demise were recorded as outcome measures. Data analyzed with SPSS version 27.

3. Results

Table 1. Distribution of patient by Age at Presentation.

Age range	Frequency	Percent (%)
less than 12 hours	1	11.1

Age range	Frequency	Percent (%)
12-24 hours	2	22.2
24-36 hours	2	22.2
36-48 Hours	4	44.4
Total	9	100

This table shows that the highest age range at presentation was between 36-48hours (44.4%) emphasizing late presentation of this pathology.

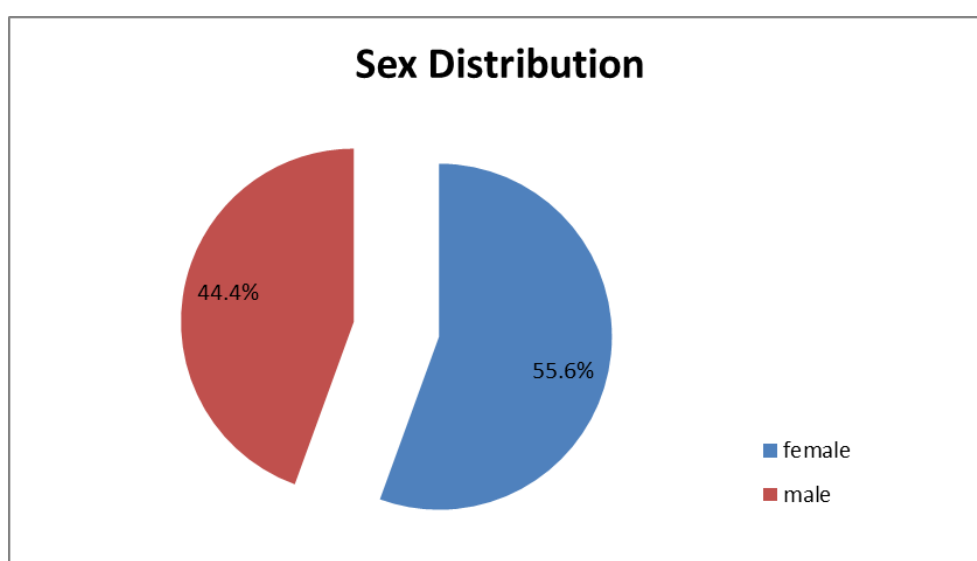


Figure 1. Sex distribution.

The figure shows that female patients had the larger proportion, with 5 patients (55.6%) of the total. Male patients accounted for 4 cases, representing 44.4%.

Table 2. Distribution of Cases by Operation Performed.

Operation Performed	Frequency	Percent
Exploratory Laparotomy + Silo Application	5	55.5
Exploratory Laparotomy + Resection and Anastomosis + Primary closure	2	22.2
Primary Closure without resection	2	22.2
Total	9	100.0

The table shows that exploratory laparotomy with silo application were the most frequently performed procedures, each accounting for 55.5% of cases.

Table 3. *Technique of Anaesthesia.*

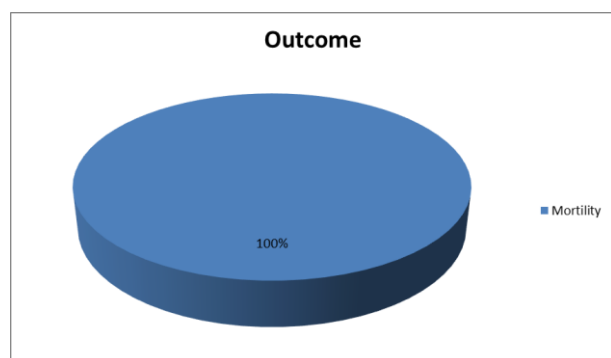
Technique of Anaesthesia	Frequency	Percent
General Anaesthesia + Endotracheal Intubation	9	100
Total	9	100

The table shows that general anaesthesia technique was used in all the patient.

Table 4. *Length of Hospital Stay.*

Days of Hospital Stay	Frequency	Percent
1-5	2	22.2
6-10	4	44.4
11-15	2	22.2
16-20	1	11.1
Total	9	100.0

The table shows that the duration of hospital stay ranged from 3 to 16 days. The most common duration of hospital stay was 6-10 days range, representing 44.4% of the patients.

**Figure 2.** *Distribution of Outcome of patients.*

4. Discussion

Most neonates with gastroschisis presents within the first few hours of life, but some will present upto 48hours of life as seen in this study which aligns with reports of some authors [1, 3], this variation in age at presentation, reflects known challenges in referral systems and perinatal care in many low- and middle-income settings [4, 11], thus increases susceptibility to hypothermia, hypotension, and metabolic disturbances

during anesthesia, therefore aggressive perioperative replacement of insensible and third-space fluid losses is essential for good outcome [2].

Just as in this study, General anesthesia with endotracheal intubation is the standard practice worldwide for patient with gastroschisis [7], because these neonates require a secured airway to protect against aspiration and to allow controlled ventilation, particularly as abdominal closure increases intra-abdominal pressure and compromises respiratory mechanics [1].

Intraoperative hypothermia is common in neonatal surgery and is associated with coagulopathy, metabolic instability, and increased infection risk [6], hence the need for neonates to be nursed under perioperative active warming devices which are limited in our setting and warmed fluids to better the outcome postoperatively. It is important to recognize that each surgical neonate requires a unique approach to management, influenced by factors such as preoperative conditions and the involvement of a multidisciplinary team [13].

The high mortality recorded in this study was attributed to postoperative sepsis and respiratory failure consistent with previous studies that identify infection and ventilatory problems as leading causes of mortality in gastroschisis [4, 5]. The projected need for postoperative mechanical ventilation in a significant proportion of neonates reflects the combined effects of anesthesia, abdominal closure, and preexisting respiratory compromise. From an anesthetic standpoint, this underlines the importance of planning for postoperative support and ensuring smooth transition from theater to intensive care or neonatal unit.

Better outcome and lower mortality rate is noticed in high-income countries but poor outcome and higher mortality rates

occur in Nigerian centers just like in this study and it is similar in other sub-Saharan African centers [4, 12]. This disparity underscores the influence of factors such as availability of neonatal intensive care and equipment. This is because in low-resource settings, neonatal surgical care is delivered without access to the specialized equipments and consumables considered standard in high-income environment, thus clinicians must often adapt available materials to support safe perioperative care [14].

Studies have shown that careful airway management, controlled ventilation, and vigilant monitoring reduce perioperative mortality [7]. The results extend this by suggesting that local anaesthesia, when optimized, may narrow the survival gap between low- and high-resource settings, as neonatal surgical mortality was significantly influenced by perioperative factors, targeted intervention, infection control, thermal regulation as well as care for preterm and low birth weight neonates may improve outcomes [15].

5. Conclusion

Neonates with gastroschisis present significant perioperative challenges due to their physiologic immaturity. Availability of effective neonatal perioperative care gadgets is closely linked to good clinical outcome. We therefore recommend development of standardized institutional protocols for perioperative management of neonates with gastroschisis, neonatal intensive care unit, ventilators and use of local anaesthesia instead of general anaesthesia during surgical invention, especially when it is silo application alone.

Abbreviations

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Author Contributions

Iluobe Inegbenosun: Data curation, Formal Analysis, Methodology, Resources, Writing – original draft, Writing – review & editing

Osayomwanbo Osaheni: Conceptualization, Data curation, Formal Analysis, Resources, Writing – original draft

Conflicts of Interest

The authors declare no conflicts of interest.

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