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Advances in Neonatology: Evolution of Gastroschisis Management in a Developing Country.

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ABSTRACT

Introduction: Gastroschisis presents a major challenge in resource-limited settings, particularly in Benin, where it was historically deemed 100% fatal until 2023. The implementation of a specific management protocol has led to a remarkable increase in survival rates.

Methods: prospective cross-sectional and observational study conducted at CHU-MEL in Cotonou from 1 year. A structured protocol was implemented

Results: Eight infants with gastroschisis were managed. Due to local constraints, the protocol could not be fully applied in all cases, particularly regarding antenatal diagnosis, general anesthesia, and parenteral nutrition. Seven cases presented with extensive perivisceritis, while one case involved vanishing gastroschisis. Half of the infants underwent primary closure. Three infants survived, corresponding to a survival rate of 37%, compared to the previous 0%. The primary causes of mortality were hypoglycemia and failure to recover from anesthesia.

Conclusion: This improvement demonstrates that progress is achievable with a structured approach. However, challenges remain, notably the lack of systematic antenatal diagnosis, anesthetic complications, and the unavailability of parenteral nutrition

Keywords: gastroschisis, mortality, structured protocol

INTRODUCTION

Gastroschisis is a congenital defect of the anterior abdominal wall characterized by evisceration of the intestinal loops without a covering membrane [1]. Its management remains a major challenge in low-resource settings, where mortality rates are still extremely high [2]. Until 2023, gastroschisis was considered uniformly fatal in Benin [3]. The management of this condition has historically been hindered by several constraints, including the absence of antenatal diagnosis, difficulties related to neonatal anesthesia, and the lack of parenteral nutrition [3].

The implementation of a structured management protocol at the Mother and Child Teaching Hospital Lagune (CHU-MEL), Cotonou, has led to a remarkable improvement in survival, reaching 37% within one year.

This study aims to evaluate these advances and to identify the persistent challenges in the management of gastroschisis in a resource-limited setting.

METHODS

This was a prospective, cross-sectional, observational study conducted at CHU-MEL, Cotonou, from March 2024 to March 2025.

In response to the previously dismal outcomes, a specific management protocol for gastroschisis was introduced. This

protocol was based on several key components:

1. Optimization of antenatal diagnosis, through routine prenatal ultrasound screening performed quarterly and then monthly after 28 weeks of gestation to detect gastroschisis.

2. Improvement of obstetric management, including planned delivery between 36 and 37 weeks of gestation to reduce the risk of perivisceritis, and in utero transfer to a level III center with neonatal surgical capabilities.

3. Immediate neonatal management, focusing on protection of the exposed bowel, prevention of heat loss, hemodynamic stabilization, and early surgical assessment.

4. Postoperative resuscitation and care, including early extubation, parenteral nutrition when available, antibiotic prophylaxis, and stimulation of bowel transit..

The variables studied included antenatal follow-up, presence or absence of antenatal diagnosis, and adherence to the implemented protocol.

RESULTS

Eight neonates with gastroschisis were managed during the study period. Due to local constraints, the protocol could not be fully implemented in all cases, particularly regarding antenatal diagnosis, general anesthesia, and parenteral nutrition.

Seven neonates presented with extensive perivisceritis, while one case was classified as vanishing gastroschisis. Half of the patients underwent primary closure of the abdominal wall defect (Table 1).

All cases were referred from peripheral centers after vaginal delivery and incidental postnatal findings

Three infants survived (Figures 1 and 2), corresponding to a survival rate of **37% at six months of follow-up**. The main causes of death were hypoglycemia, malnutrition, and failure to recover from general anesthesia.

Improved survival could potentially be achieved with effective parenteral nutrition and adequate hydration through surgically placed central venous access.

Table 1. Clinical characteristics, management, and outcomes of neonates with gastroschisis

Patients	Gestational age (weeks)	Time to management	Type of gastroschisis	Anesthesia	Bowel reduction	Outcome and cause of death
1	39	Day 3	Simple + perivisceritis	No	Two-stage	Died (Hypoglycemia)
2	38	Day 2	Simple + perivisceritis	No	One-stage	Alive
3	38	Day 2	Simple + perivisceritis	No	Two-stage	Died (Hypoglycemia
4	39	Day 2	Simple + perivisceritis	No	One-stage (reoperation for umbilical necrosis	Alive
5	37	Day 3	Simple + perivisceritis	No	Two-stage	Died (Hypoglycemia
6	34	Day 1	Simple + perivisceritis	Yes	Two-stage	Died (Failure to recover from GA)
7	38	Day 2	Vanishing gastroschisis	Yes	One-stage	Died (Failure to recover from GA
8	37	Day 2	Simple + perivisceritis	No	One-stage	Alive

Figure1: Exposed bowel loops in gastroschisis; Figure2: one-staged reduction in gastroschisis; Figure3: gastroschisis 4 months post-reintegration

DISCUSSION

This study demonstrates that the implementation of a structured management protocol for gastroschisis at CHU-MEL resulted in a marked improvement in survival, reaching 37% within one year, compared to the historically reported 100% mortality in Benin prior to 2023. Although the number of cases remains limited, this improvement represents a significant change in outcome in a resource-limited setting.

The hospital frequency observed in our center appears comparable to that reported in South Africa and Brazil, with approximately 4–5 cases per year [3,4]. In contrast, higher incidences have been reported in high-income countries, such as 14.3 cases per year in the United States and 12 cases per year in Singapore [5,6]. As in most sub-Saharan African series, the true incidence of gastroschisis in our context is likely underestimated. Socioeconomic constraints, cultural factors, and inadequate referral systems contribute to early neonatal deaths before presentation to specialized centers, limiting accurate epidemiological assessment.

In our series, no neonate benefited from antenatal diagnosis despite the introduction of a protocol emphasizing prenatal screening. This finding is consistent with reports from other African studies, where antenatal detection rates remain very low.

Limited access to quality obstetric ultrasound, insufficient training of healthcare providers, high costs, and inadequate prenatal follow-up largely explain this situation. Antenatal diagnosis is crucial for improving outcomes, as it allows planned delivery, in utero transfer to tertiary centers, and immediate neonatal surgical care [7]. Its absence in our series contributed to delayed presentation and extensive bowel inflammation.

All neonates were delivered vaginally in peripheral level I maternity units, reflecting the absence of antenatal diagnosis. The optimal mode and timing of delivery for gastroschisis remain controversial. Several studies have shown no significant difference in outcomes between vaginal delivery and cesarean section [8,9], while others have suggested potential benefits of planned preterm delivery [10,11]. More recent data support expectant management until spontaneous labor [12].

In our setting, the primary challenge is not the mode of delivery itself but the lack of antenatal diagnosis, which precludes appropriate obstetric and neonatal planning.

Optimal management of gastroschisis requires specialized neonatal intensive care, including thermoregulation, gastric decompression, fluid and electrolyte management, infection prevention, ventilatory support when needed, and parenteral nutrition via central venous access [13].

In our context, major limitations persist, particularly the lack of neonatal intensive care facilities and unavailability of parenteral nutrition. None of the neonates in our series received total parenteral nutrition, which likely contributed to deaths due to hypoglycemia and malnutrition. Similar limitations have been reported across sub-Saharan Africa [14, 15].

Several authors have emphasized that improved survival in low- and middle-income countries relies more on the implementation of simple, standardized protocols and multidisciplinary coordination than on advanced technology [19]. This observation strongly supports the relevance of the pragmatic protocol applied in our series, despite severe resource limitations.

The introduction of a structured management protocol directly influenced surgical decision-making and outcomes. Unlike previous experiences in Benin, where gastroschisis was uniformly fatal, the protocol emphasized early surgical assessment, standardized care pathways, and individualized selection of closure techniques based on bowel condition and available

resources.

In this series, 50% of patients underwent primary closure, while others required staged reduction due to severe perivisceritis. All surviving infants were managed according to protocol-guided principles, underscoring the importance of structured care rather than reliance on a single surgical technique.

Although meta-analyses favor staged closure using preformed silos in terms of ventilatory requirements and risk of abdominal compartment syndrome [16–18], such strategies are often limited in low-resource settings. Our findings suggest that protocol-based, context-adapted surgical management can significantly improve survival even in the absence of advanced technology. In our setting, the limited availability of safe neonatal anesthesia significantly influenced the choice of surgical strategy, as also reported in other low-resource environments [20].

The survival rate of 37% observed in this study represents a substantial improvement compared with previously reported mortality rates of 75–100% in sub-Saharan Africa [15,21,22]. In contrast, mortality rates below 5% are reported in high-income countries [23–26].

Persistent mortality in our series was multifactorial, reflecting delayed presentation, lack of antenatal diagnosis, anesthetic complications, and absence of parenteral nutrition. Nevertheless, the improved outcomes observed confirm that gastroschisis remains a sensitive indicator of neonatal surgical capacity and health system performance.

CONCLUSION

The implementation of a structured management protocol for gastroschisis at CHU-MEL resulted in a significant improvement in survival in a setting where outcomes were previously uniformly fatal. Despite persistent challenges—particularly in antenatal diagnosis, neonatal anesthesia, and nutritional support—this experience demonstrates that meaningful progress is achievable through protocol-driven, context-adapted care in low-resource environments

REFERENCES

1. Ducellier G, Moussy P, Sahmoune L, Bonneau S, Alanio E, Bory JP. Laparoschisis: sonographic and obstetrical factors predicting an unfavorable postnatal evolution. Gynecol Obstet Fertil. 2016;44:461–467.
2. Ford K, Poenaru D, Moulot O, Tavener K, Bradley S, Bankole R, et al. Gastroschisis: Bellwether for neonatal surgery capacity in low-resource settings. J Pediatr Surg. 2016;51:1262–1267.
3. Ade-Ajayi N, Manson J, Lever F, Hesse A, Millar A, Emil S, et al. Gastroschisis: a multi-centre comparison of management and outcome. Afr J Paediatr Surg. 2012;9:17.
4. Soares H, Silva A, Rocha G, Pissarra S, Correia-Pinto J, Guimarães H. Gastroschisis: preterm or term delivery? Clinics. 2010;65:139–142.
5. Fillingham A, Rankin J. Prevalence, prenatal diagnosis and survival of gastroschisis: a registry-based study. Prenat Diagn. 2008;28:1232–1237.
6. Tan KB, Tan KH, Chew SK, Yeo GS. Gastroschisis and omphalocele in Singapore: a ten-year series. Singapore Med J. 2008;49:31–36.
7. Oakes MC, Porto M, Chung JH. Advances in prenatal and perinatal diagnosis and management of gastroschisis. Semin Pediatr Surg. 2018;27:289–299.
8. Boutros J, Regier M, Skarsgard ED. Is timing everything? Influence of gestational age, birth weight, and route of delivery on outcome in gastroschisis. J Pediatr Surg. 2009;44:912–917.
9. Overcash RT, DeUgarte DA, Stephenson ML, Gutkin RM, Norton ME, Parmar S, et al. Factors associated with gastroschisis outcomes. Obstet Gynecol. 2014;124:551–557.
10. Mesas Burgos C, Svenningsson A, Vejde JH, Granholm T, Conner P. Outcomes in infants with prenatally diagnosed gastroschisis and planned preterm delivery. Pediatr Surg Int. 2015;31:1047–1053.
11. Hadidi A, Subotic U, Goeppl M, Waag KL. Early elective cesarean delivery before 36 weeks versus late spontaneous delivery in gastroschisis. J Pediatr Surg. 2008;43:1342–1346.
12. Gupta R, Cabacungan ET. Outcome of neonates with gastroschisis at different gestational ages. J Pediatr Surg. 2018;53:661–665.
13. Haddock C, Skarsgard ED. Understanding gastroschisis and its clinical management. Expert Rev Gastroenterol Hepatol. 2018;12:405–415.
14. Wright NJ, Sekabira J, Ade-Ajayi N. Care of infants with gastroschisis in low-resource settings. Semin Pediatr Surg. 2018;27:321–326.
15. Ade-Ajayi N, Wright N, Zani A. Epidemiology, management and outcome of gastroschisis in Sub-Saharan Africa. Afr J Paediatr Surg. 2015;12:1.
16. Ross AR, Eaton S, Zani A, Ade-Ajayi N, Pierro A, Hall NJ. Role of preformed silos in gastroschisis: a systematic review and meta-analysis. Pediatr Surg Int. 2015;31:473–483.

17. Pastor AC, Phillips JD, Fenton SJ, Meyers RL, Lamm AW, Raval MV, et al. Routine use of a SILASTIC spring-loaded silo. J Pediatr Surg. 2008;43:1807–1812.
18. Kunz SN, Tieder JS, Whitlock K, Jackson JC, Avansino JR. Primary closure versus staged closure with silo. J Pediatr Surg. 2013;48:845–857.
19. Wright NJ, Langer M, Norman IC, Akhbari M, Wafford QE, Ade-Ajayi N, et al. Improving outcomes for neonates with gastroschisis in LMICs. BMJ Paediatr Open. 2018;2:e000392.
20. Bösenberg AT. Neonatal anesthesia with limited resources. Paediatr Anaesth. 2014;24:98–105.
21. Ameh EA, Chirdan LB. Ruptured exomphalos and gastroschisis in Nigerian children. Pediatr Surg Int. 2000;16:23–25.
22. Wesonga AS, Fitzgerald TN, Kabuye R, Kirunda S, Langer M, Kakembo N, et al. Gastroschisis in Uganda. J Pediatr Surg. 2016;51:1772–1777.
23. Payne NR, Pfleghaar K, Assel B, Johnson A, Rich RH. Predicting outcome of newborns with gastroschisis. J Pediatr Surg. 2009;44:918–923.
24. Bradnock TJ, Marven S, Owen A, Johnson P, Kurinczuk JJ, Spark P, et al. Gastroschisis: one-year outcomes from a national cohort study. BMJ. 2011;343:d6749.
25. Capelle X, Schaaps JP, Foidart JM. Antenatal management and postnatal outcome of fetuses with gastroschisis. J Gynecol Obstet Biol Reprod. 2007;36:486–495.
26. Eggink BH, Richardson CJ, Malloy MH, Angel CA. Outcome of gastroschisis: a 20-year review. J Pediatr Surg. 2006;41:1103–1108.
27. Miranda ME, Emil S, de Mattos Paixão R, Piçarro C, Cruzeiro PCF, Campos BA, et al. A 25-year study of gastroschisis outcomes in a middle-income country. J Pediatr Surg. 2019;54:1481–1486..