



Gastroschisis in Uganda: Opportunities for improved survival



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ABSTRACT

Purpose: Neonatal mortality from gastroschisis in sub-Saharan Africa is high, while in high-income countries, mortality is less than 5%. The purpose of this study was to describe the maternal and neonatal characteristics of gastroschisis in Uganda, estimate the mortality and elucidate opportunities for intervention.

Methods: An ethics-approved, prospective cohort study was conducted over a one-year period. All babies presenting with gastroschisis in Mulago Hospital in Kampala, Uganda were enrolled and followed up to 30 days. Univariate and descriptive statistical analyses were performed on demographic, maternal, perinatal, and clinical outcome data.

Results: 42 babies with gastroschisis presented during the study period. Mortality was 98% (n = 41). Maternal characteristics demonstrate a mean maternal age of 21.8 (± 3.9) years, 40% (n = 15) were primiparous, and fewer than 10% (n = 4) of mothers reported a history of alcohol use, and all denied cigarette smoking and NSAID use. Despite 93% (n = 39) of mothers receiving prenatal care and 24% (n = 10) a prenatal ultrasound, correct prenatal diagnosis was 2% (n = 1). Perinatal data show that 81% of deliveries occurred in a health facility. The majority of babies (58%) arrived at Mulago Hospital within 12 h of birth, however 52% were breastfeeding, 53% did not have intravenous access and only 19% had adequate bowel protection in place. Four patients (9%) arrived with gangrenous bowel. One patient, the only survivor, had primary closure. Average time to death was 4.8 days [range < 1 to 14 days].

Conclusion: The mortality of gastroschisis in Uganda is alarmingly high. Improving prenatal diagnosis and post-natal care of babies in a tertiary center may improve outcome.

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1. Background

Gastroschisis is a congenital anomaly in which abdominal organs, primarily the small and large intestine, protrude through an uncovered defect in the anterior abdominal wall. Newborns with this defect require emergent surgical intervention in the early neonatal period, necessitating treatment in a tertiary care hospital with pediatric surgical services. The need for in-hospital delivery or emergent neonatal transfer highlights the importance of prenatal diagnosis in helping locate and plan perinatal care [1].

Gastroschisis is increasing throughout the world for unknown reasons [2–4]. As with several other congenital abnormalities, gastroschisis is diagnosed in the antenatal period more frequently because of the widespread use of maternal serum α -fetoprotein screening and obstetric ultrasonography [5]. In Uganda outcomes have been poor, with only rare survivors. There are reports of low-income countries with better

outcomes, but available studies reveal consistently high mortality, ranging from 33% to 100% across sub-Saharan Africa [1,6,7]. With modern treatment, survival exceeds 90% in high-income countries [8].

The goal of this study was to describe the epidemiology of babies born with gastroschisis in Uganda. Understanding this condition begins with understanding maternal care and delivery conditions, with the aim of making an accurate prenatal diagnosis. Early diagnosis and maternal preparation for delivery at a tertiary center may improve outcomes in Uganda.

2. Methods

A prospective cohort study was performed at Mulago Hospital in Kampala, Uganda. This is the only tertiary hospital in Uganda offering pediatric surgical services and also receives referrals from surrounding countries. All babies who presented with gastroschisis and their mothers were enrolled consecutively between February 2014 and February 2015. Approval for this study was obtained by the institutional review board at Makerere University School of Medicine. Informed

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consent was obtained by all enrolled mothers and participation in the study was entirely voluntary.

Maternal data included age, parity, occupation, prenatal diagnosis of gastroschisis, prenatal medications (NSAIDs, vasoconstrictive drugs), use of alcohol and smoking history, level of education, prenatal infections, local herbs, and change of husband. Neonatal data included gestational age, birth weight, electrolytes, random blood sugar, time to surgery, type of surgery, time to referral, time to arrival at the referral center, time to surgical review, condition of the bowel, complex presentation, presence of a nasogastric tube, presence of intravenous access, dressing of the bowel at presentation and means of transport to Mulago Hospital. Mortality was recorded.

All babies who presented with gastroschisis were examined by the surgical house officer, and the parents were counseled regarding the poor prognosis of gastroschisis. The presenting bowel covering was removed, and the bowel was placed into a sterile urine bag. The open end of the urine bag was sewn to the gastroschisis defect using a nylon suture. Babies were admitted to the surgical ward, and given intravenous fluids and antibiotics.

Data were collected using pretested and validated interview administered questionnaires. Univariate analysis was performed for baseline factors of the study participants (SPSS16 statistical software package).

3. Results

Over a period of one year, 42 participants were followed for 30 days. Gastroschisis was more prevalent in young, primiparous mothers (Fig. 1). The mean maternal age was 22 ± 3.9 years. Most mothers (25, 60%) were relatively uneducated (no secondary or university education), and 34 (80%) were housewives with low socioeconomic class (Table 1). 39 mothers (93%) had at least one prenatal care visit, but only 10 (24%) had a prenatal ultrasound. Ultrasounds were performed during the second trimester by ultrasound technicians, holding a diploma. Of those 10, only 2 received a diagnosis of an abdominal wall defect, and one was incorrectly diagnosed with omphalocele. All mothers denied a family history of gastroschisis and use of NSAIDs or smoking during pregnancy. One third of mothers reported an infection during pregnancy.

Delivery details are depicted in Table 2. 30 babies were born at term (71%). There was one twin pregnancy. The overwhelming majority of babies were born by vaginal delivery (40, 95%). Most babies were born in a health facility (34, 81%), but 5 babies were born at home (12%) and 3 on the roadside (7%). 27 patients needed to travel more than 50 km to reach Mulago Hospital (64%). Of the patients who delivered outside of Mulago Hospital, only 13 were transported by ambulance (35%). 30 babies were born at term (71%) but 29 weighed below

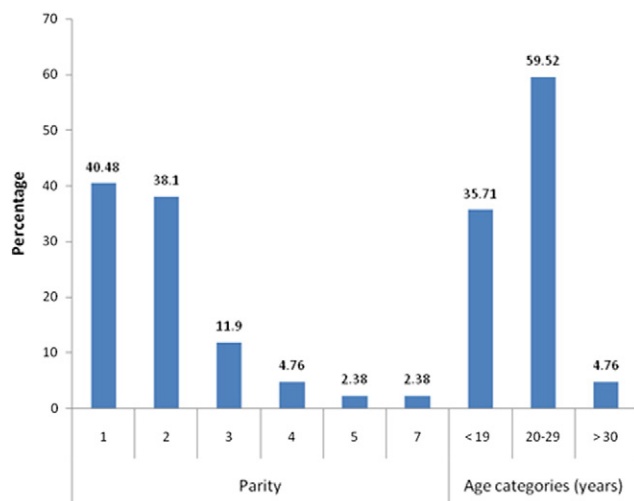


Fig. 1. Maternal age and parity.

Table 1

Maternal characteristics.

	Participant distribution	
	Number	Percentage
Education level		
Primary (7 years)	25	59.5
Secondary (13 years)	15	35.7
University	2	4.8
Occupation		
Housewife	34	80.9
Farmer	5	11.9
Self employed	2	4.8
Skilled	1	2.4
Antenatal attendance		
No	3	7.2
Yes	39	92.9
Ultrasound scan done		
No	32	76.2
Yes	10	23.8
Infection during pregnancy		
No	28	66.7
Yes	14	33.3
Alcohol use		
No	38	90.5
Yes	4	9.5
Status of other children ^a		
Normal	23	92.0
Abnormal	2	8.0
Same father of other children ^a		
No	11	45.8
Yes	13	54.2

^a Only applies to parity 2 and above.

2.5 kg (69.1%). Male to female ratio was almost equal (1.1:1). Only 4 babies (10%) were born at Mulago Hospital, the regional referral center.

The timing from delivery to presentation varied greatly: 3 babies (7%) presented on day of life 3, 2 babies (5%) on day of life 2, 10 babies (24%) at 24–48 h, 18 babies (43%) within 10–12 h, 2 babies (5%) after 7 h, 1 baby (2%) at 4 h and 4 babies (10%) were delivered at Mulago Hospital. 2 babies (5%) were delivered on route to the hospital.

Fig. 2 shows the geographic locations in Uganda where babies were conceived and mothers traveled from to reach Mulago Hospital. Many babies came from the southwest of the country, with the districts of Kibaale (7 patients, 17%) and Luweero (4 patients, 10%) having the greatest number.

35 babies (83%) did not have a nasogastric tube present during transport to the hospital and 23 (54%) arrived without intravenous access or hydration since delivery. 22 babies (53%) arrived with gauze wrapped directly over the exposed bowel but 12 babies (29%) had no dressings with the bowel exposed and contaminated by urine and stool. Only 8 babies (19%) had the bowel well wrapped in a protective plastic bag and this included the babies born in Mulago hospital. Despite these conditions, most patients arrived with viable bowel; only 4 patients (10%) arrived with gangrenous bowel.

11 babies (27%) presented with abnormal blood chemistry (Fig. 3). Electrolyte derangements included hyperkalemia (56%), elevated urea (49%), hyponatremia (29%), hypochloremia (22%), elevated creatinine (22%) and hypoglycemia (7%).

Out of the 42 study participants, 9 (21%) had surgery performed. The remaining babies did not have surgery, because of the following reasons:

1. Septic bowel

2 babies had purulent, foul-smelling discharge from the bowel at presentation. These babies both died within 24 h after admission.

2. Too much bowel exposed

1 baby presented with the whole length of jejunum, ileum and stomach exposed. This baby was not taken to the operating room, as it was thought that reduction would not be immediately possible. A silo was placed, but the baby did not survive to have closure.

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