

Original Research Article

Epidemiological, Clinical, and Management Aspects of Uterine Rupture at the Essos Hospital Center, Yaoundé, Cameroon

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Abstract: Uterine rupture remains an obstetric complication associated with high maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries. This study aimed to describe the epidemiological profile, clinical presentation, management, and outcomes of uterine rupture at the Essos Hospital Center in Yaoundé, Cameroon. We conducted a retrospective descriptive study over 10 years from January 2012 to December 2022 at the Essos Hospital Center, a tertiary referral facility in Yaoundé. Medical records of women diagnosed with uterine rupture were reviewed. Sociodemographic characteristics, obstetric history, labor profile, intraoperative findings, management modalities, and maternal and neonatal outcomes were analyzed using SPSS version 23. The study revealed 26 cases of uterine rupture among 29,573 deliveries. The mean maternal age was 33.65 ± 5.21 years. Most women were multiparous, and more than half had previous uterine surgery, mainly cesarean section. Half of the patients were referred from other facilities. Complete uterine rupture occurred in most cases and most frequently involved the uterine body. Hysterectomy was the most performed surgical procedure. Maternal complications were frequent, predominantly anemia. Maternal mortality was 11.5%, while perinatal mortality reached 65.4%. Bivariate analyses did not demonstrate statistically significant associations between maternal characteristics and neonatal death. Uterine rupture therefore remains a life-threatening obstetric emergency in our setting, associated with substantial maternal morbidity and extremely poor neonatal outcomes. Improved antenatal risk identification, close intrapartum monitoring, particularly among women with previous cesarean sections, and timely referral to facilities capable of providing comprehensive emergency obstetric care are essential to reduce its burden.

Keywords: Uterine Rupture, Obstetric Emergency, Maternal Morbidity, Perinatal Mortality, Cameroon.

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INTRODUCTION

Uterine rupture (UR) is a complete non-surgical break in the continuity of all uterine wall layers. UR occurs mostly during pregnancy or labor [1], however it has been reported in non-gravid uteri after uterine exposure to infection, trauma or a neoplasm [2]. Rupture often results in serious morbidity and mortality for both mother and neonates, and it is an obstetrical emergency. Uterine rupture is more frequent in women with a history of cesarean delivery [3]. The rate of uterine rupture is

highly proportional to the number of cesarean deliveries and type of uterine incision previously done. That rate is approximately 1% for women with one previous cesarean delivery as opposed to 3.9% for those with more than one cesarean scar [4]. Regarding the type of uterine incision done previously, women with a former midline (classical cesarean section or inverted T or J-like) incision are at two-to-three-fold higher risk for uterine rupture than those with a previous low segment transverse incision [5]. The use of Misoprostol has been associated with an increased risk of uterine rupture [6].

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Generally, uterine rupture has been reported to occur once for every 5,000 to 7,000 births [7]. The incidence of RU is low in industrialized countries and generally occurs as a result of a trial of labor after cesarean delivery (TOLAC) [1]. Conversely, the incidence of UR in an unscarred uterus is higher in resource-limited countries [8]. It is theorized that this rate is higher because management of obstructed labor are not readily available, for example, use of instrument-assisted and cesarean delivery [8]. Data from sub-Saharan Africa demonstrate frequencies different than those in resource rich countries. In Senegal a study in referral medical center showed that UR occurred in 1 per 172 deliveries [9]. In Cameroon, Fouedjio *et al.*, reported the frequency of UR as 0.46% (30 cases per 6,511 deliveries) [10], while another study at the Douala General Hospital concurred with a prevalence at 0.40% [11].

This obstetric complication is associated with high maternal and fetal mortality rates [1]. However, the mortality rate is low in developed countries, with zero maternal deaths in a series by Guillianio *et al.*, Bujold *et al.*, Zwart *et al.*, Menihan and Yap *et al.* Fetal death in the same series ranged from 0 to 13.6% [3–15]. On the other hand, in developing countries the prognosis is poor, with a maternal mortality rate of 6.7% and a fetal death rate of between 80% and 100% according to Fouedjio *et al.*, [10], and 6% to 66% according to Halle-Ekane *et al.*, [11].

Factors associated with UR in resource-poor countries in the literature include TOLAC, diagnostic and management delays of dystocia [16, 17]. However, a study in Senegal by Seydou reported different factors, like the absence of antenatal contacts, advanced maternal age associated with multiparity, late obstetric evacuations and abnormal presentations [18]. In Cameroon, Fouelifack reported average level of education, low monthly income, lack of infrastructure and inadequate personnel as risk factors [19], while Halle-Ekane showed that UR was mainly linked to the use of Misoprostol [11].

Our retrospective study over 10 years (2012 to 2022) aimed at describing the sociodemographic and clinical profiles of patients with uterine rupture at the Essos hospital center, a reference hospital in Yaoundé, Cameroon. We also report on the incidence, risk factors like presence of a prior uterine scar and use of prostaglandins, management modalities and complications.

METHODS

We carried out a descriptive study with retrospective data collection over a 10-year period, from January 01, 2012, to December 31, 2022, at the Essos Hospital Center. This is a parastatal, tertiary referral

institution in Yaoundé with 2000 deliveries yearly. Cases referred include women with challenging obstetrical problems and severe diseases of pregnancy. We included medical records of UR cases that occurred during the study period. We excluded incomplete medical records. We obtained ethical clearance from the institutional ethics committee of the University of Douala Faculty of Medicine and Pharmaceutical Sciences and authorization from the director of Essos Hospital Center.

Variables Studied

We collect four independent variables from labor room registers and patient charts: 1-sociodemographic data including age, marital status, occupation, region of origin, residence (urban or rural), level of education. 2-the clinical profile of parturients like parity, history of uterine surgery, mode of labor onset, uterine fundal height, presence of fetal heart tones, fetal presentation, use of uterotonics (prostaglandins and/or oxytocin), duration of labor prior to UR diagnosis and location of rupture, and presence of comorbidities like hypertensive disease and diabetes. 3-management aspects including conservative versus radical, and 4-maternal and fetal complications. We defined maternal complications as hemodynamic shock and/or postpartum hemorrhage (a cumulative blood loss 1000mL or more accompanied by signs or symptoms of hypovolemia 24h post-delivery [20], and the need for blood products, hysterectomy, obstetric injury (genital and/or urinary injury), and maternal death. We defined neonatal complications as Apgar score <7 at 5min, neonatal intensive-care unit (NICU) admission, and neonatal demise.

Data Processing and Analysis

Data were recorded and analyzed using SPSS version 23.0 analysis software. Compilation, tables and graphs were produced using Microsoft Excel 2021.

Qualitative variables were described by their numbers and percentages, such as gender and comorbidities, and were presented in the form of commented tables and figures.

Qualitative variables were expressed in terms of numbers and frequencies. For quantitative variables, data was expressed as mean \pm standard deviation for normal data distribution, or medians (interquartile range) in the case of skewed distribution.

RESULTS

Sociodemographic Characteristics

The mean age of participants was 33.65 ± 5.21 years (range: 23–42). Most were 35–40 years old (30.8%), married (53.8%), and from the Centre Region (30.8%). The majority were educated (88.5%) and worked in the informal sector (26.9%), while 57.7% resided in rural areas (Table I).

Table I: Sociodemographic characteristics

Variables	Study population (N=26)	Frequency (%)
Age group (years)		
[20-25]	1	3.8
[25-30]	6	23.1
[30-35]	7	26.9
[35-40]	8	30.8
[40-40]	4	15.4
Matrimonial status		
Married	14	53.8
Single	6	23.1
Cohabitation	6	23.1
Region of origin		
Center	8	30.8
Far North	7	26.9
West	2	7.7
Littoral	2	7.7
South	2	7.7
Southwest	2	7.7
Northwest	1	3.8
East	1	3.8
Foreigner	1	3.8
Educational level		
None	3	11.5
Primary	6	23.1
Secondary	12	46.2
Tertiary	5	19.2
Profession		
Self-employed	7	26.9
Housewife	5	19.2
Civil servant	5	19.2
Private sector employee	5	19.2
Student	4	15.4
Location of residence		
Urban	11	42.3
Rural	15	57.7

Clinical of Profile of Study Subjects

Most women were multiparas (34.6%) with grand multiparity constituting 19.2% cases. Previous surgery was reported in 53.9% (n = 14), mainly cesarean

sections (50.0%). Comorbidities occurred in 30.8% (n = 8), predominantly HIV infection (15.4%). All pregnancies were singleton (100%) (Table II).

Table II: Clinical of profile of study subjects

Variables	Study population (N=26)	Frequency (%)
Parity		
Primiparous	5	19.2
Pauciparous	7	26.9
Multiparous	9	34.6
Grand multiparous	5	19.2
Previous uterine surgery		
None	12	46.1
Cesarean	13	50.0
Myomectomy	1	3.9
Comorbidities		
Hypertensive disease	3	11.7
Diabetes	2	7.7
Type of pregnancy/fetal presentation		
Singleton	26	100.0

Variables	Study population (N=26)	Frequency (%)
Cephalic	24	92.3
Compound presentation	2	7.7

Labor Profile of Study Subjects

As shown in Table III, half of the patients were referred (50.0%), while the other half presented directly to the facility (walk-in, 50.0%). Regarding uterotonic

use, most women (69.2%) did not receive any uterotonics prior to the rupture. Among those who did, oxytocin was the most used agent (23.1%), followed by misoprostol (7.7%)

Table III: Labor profile of study subjects

Variables	Study population (N=26)	Frequency (%)
Admission mode		
Walk-in	13	50.0
Referred	13	50.0
Use of uterotonics		
None	18	69.2
Oxytocin	6	23.1
Misoprostol	2	7.7

Clinical Characteristics of Study Population at Diagnosis of UR

Among the 26 women, vaginal bleeding occurred in 9 cases (34.6%), while 17 (65.4%) had none. Systolic blood pressure ≥ 90 mmHg was observed in 20

women (77.0%), whereas 6 (23.0%) had SBP < 90 mmHg. Maternal tachycardia (≥ 100 bpm) was present in 9 cases (34.6%) and absent in 17 (65.4%). Fetal heart tones were present in 13 cases (50.0%) and absent in 13 (50.0%).

Table IV: Clinical characteristics of study population at UR diagnosis

Variables	Study population (N=26)	Frequency (%)
Vaginal bleeding		
Yes	9	34.6
No	17	65.4
Signs of HD instability		
SBP (mm Hg)		
≥ 90	20	77.0
< 90	6	23.0
Maternal tachycardia		
≥ 100	9	34.6
< 100	17	65.4
Fetal heart tones		
Present	13	50.0
Absent	13	50.0

Intraoperative Findings

Most ruptures were complete (92.3%), while partial ruptures accounted for 7.7%. The uterine body was the most frequent site (57.7%), followed by the

lower segment (26.9%) and the fundus (15.4%). Bladder injuries occurred in 15.4% of cases, and broad ligament hematoma in 3.8%.

Table V: Intraoperative findings

Type of rupture		
Complete	24	92.3
Partial	2	7.7
Rupture location		
Body	15	57.7
Lower segment	7	26.9
Fundus	4	15.4
Other injuries		
Bladder	4	15.4
Broad ligament hematoma	1	3.8

Type Surgical Management Following UR (Percentage)

Figure 1 shows that hysterectomy was the most frequently performed surgical procedure, accounting for most cases. Subtotal hysterectomy represented 38.5%,

while total hysterectomy accounted for 23.1%. Among uterus-preserving procedures, hysterorrhaphy with bilateral tubal ligation (BTL) was performed in 23.1% of cases, whereas hysterorrhaphy without BTL represented 15.3%.

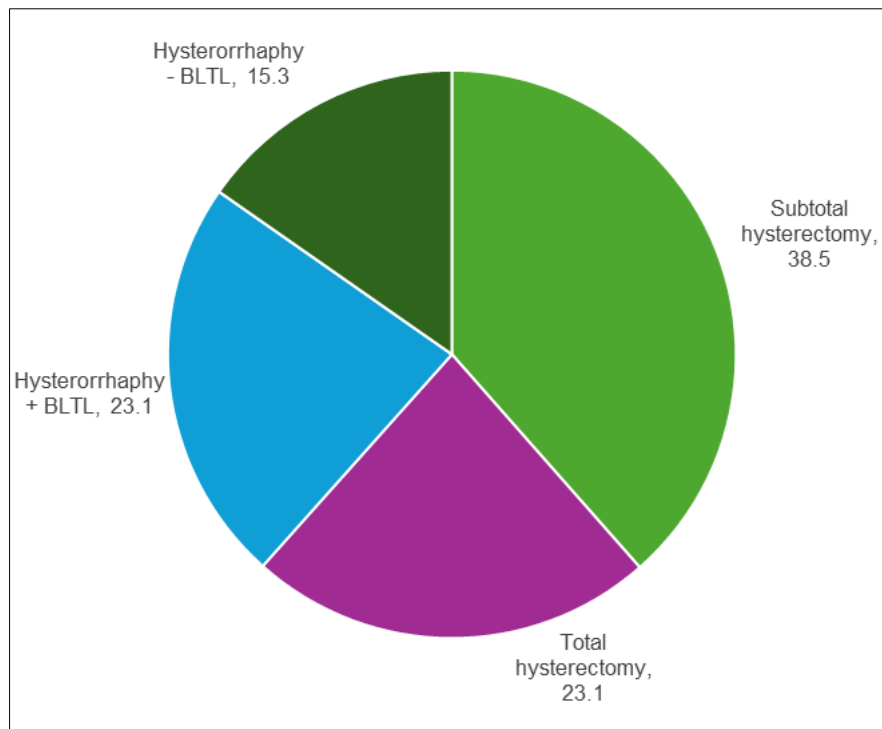


Figure 1: Types of surgical procedures post UR

Maternal Complications Post Uterine Rupture

Among the 26 women with uterine rupture, majority (24) experienced complications. Anemia was the most frequent maternal complication, occurring in 15

cases (57.7%). Wound infection occurred in 4 cases (15.4%), while endometritis was reported in 3 cases (11.5%). Septicemia and phlebitis were each observed in 1 case (3.8%).

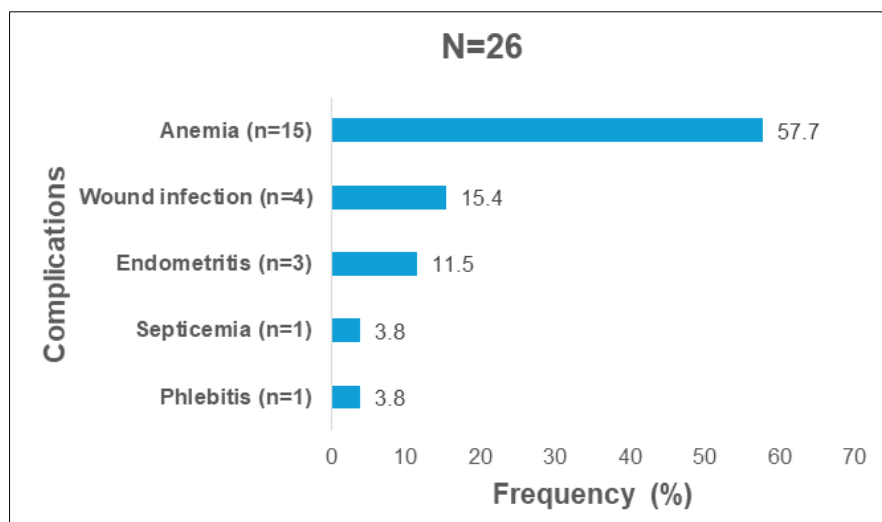


Figure 2: Maternal complications post UR

Maternal and Neonatal Outcome at Discharge

At discharge, most mothers had a favorable outcome, accounting for 88.5% of cases discharged alive, while maternal deaths occurred in 11.5%.

Regarding neonatal outcomes, live births represented 34.6%, whereas perinatal deaths accounted for 65.4% of cases.

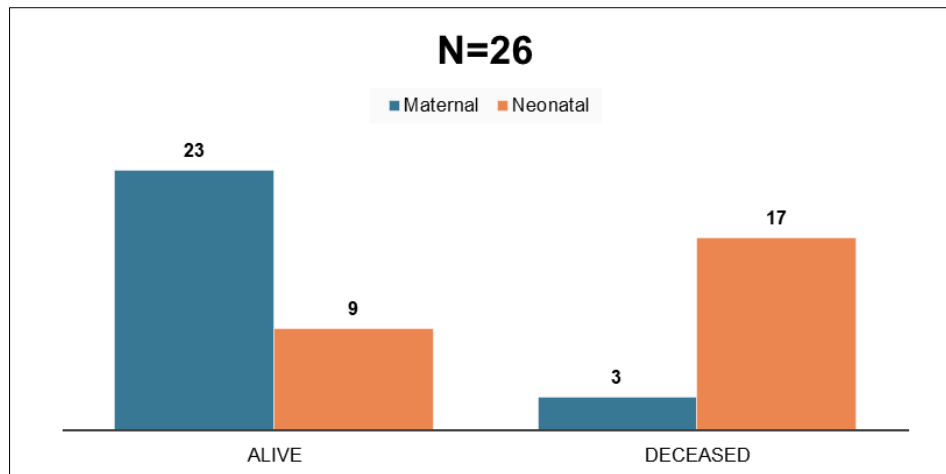


Figure 3: Maternal and neonatal outcome at discharge

Is Maternal Age and/or Clinical Profile Associated with Neonatal Death?

In bivariate analyses to determine the association between maternal age and/or clinical profile and neonatal death, Table VI shows the distribution of neonatal outcomes according to maternal age. Among the 17 neonatal deaths, most occurred in mothers aged 35–40 years (n=6) and 25–30 years (n=5). Among the 9 surviving neonates, most were born to mothers aged 30–35 years (n=4). Odds ratios with 95% confidence intervals presented for each age group show all p-values

are >0.05. Table VII shows neonatal outcomes according to parity and maternal comorbidities. Among the 17 neonatal deaths, 2 and 6 occurred in primiparous and pauciparous women, respectively, 6 in multiparous, 3 in grand multiparous women. Among the 9 surviving neonates, 3 were born to primiparous, 3 to multiparous, 2 to grand multiparous, and 1 to a pauciparous woman. Regarding comorbidities, 3 neonatal deaths occurred in mothers with diabetes and 2 in those with hypertensive disease. All these p-values are greater than 0.05.

Table VI: Association between maternal age and neonatal death

Maternal age (years)	Deceased	Alive	OR (95% CI)	P- value
	N=17	N=9		
[20-25]	1	0	/	0.654
[25-30]	5	1	3.33 (0.32-34.12)	0.296
[30-35]	3	4	0.26 (0.04-1.64)	0.159
[35-40]	6	2	1.90 (0.29-12.26)	0.413
[40-50]	2	2	0.46 (0.05-4.02)	0.431

Table VII: Association between maternal clinical profile and neonatal death

Variables	Deceased	Alive	OR (95% CI)	P-value
	N=17	N=9		
Parity				
Primiparous	2	3	0.26 (0.03-2.01)	0.208
Pauciparous	6	1	4.36 (0.43-43.72)	0.199
Multiparous	6	3	1.09 (0.19-6.01)	0.635
Grandmultiparous	3	2	0.75 (0.10-5.57)	0.580
Comorbidities				
Diabetes	3	0	/	0.262
Hypertensive disease	2	0	/	0.418

Neonatal Outcomes According to Modes of Admission

Among the 17 neonatal deaths, 9 occurred in referred patients and 8 in walk-in patients. Among the 9 neonates discharged alive, 4 were born to referred

patients and 5 to walk-in patients. The odds ratio for referred patients was 1.40 (95% CI: 0.27–7.13) with a p-value of 0.500, while the odds ratio for walk-in patients was 0.71 (95% CI: 0.14–3.60) with the same p-value of 0.500.

Table VIII: Neonatal outcomes according to modes of admission

Variables	Décédé	Vivant	OR (95% CI)	P- value
	N=17	N=9		
Mode of admission				
Referred	9	4	1.40 (0.27-7.13)	0.500
Walk-in	8	5	0.71 (0.14-3.60)	0.500

DISCUSSION

Over our study period of 10 years, we recorded 29573 deliveries that included 26 cases of uterine rupture at the Essos Hospital Center (EHC) giving a frequency of uterine rupture 0.0009%. This is 142 times lower than that of other African authors Gueye *et al.*, 0.58%; Kabibou *et al.*, 0.70%; Amate *et al.*, 0.128% [17-22]. The difference in frequency between the EHC and other African series can be explained by the fact that although this is a referral hospital the cost of care is relatively elevated for many Cameroonians. This results in care being provided for middle to upper class Cameroonians and those with health insurance coverage, both of which constitute a relatively small size of the population. Thus, making our incidence comparable to results from resource-rich settings. The frequency in low and middle income countries (LMICs) is much higher than those reported in developed countries as reported by Cosson *et al.*, 0.007% and Miller *et al.*, at 0.0001% [23, 24]. This difference has been attributed to several factors in LMICs, including limited access to quality healthcare, delayed referral to tertiary facilities, late transfer of high-risk patients, and inadequate health coverage.

However, uterine rupture in this series remained a catastrophic obstetric emergency with marked maternal and neonatal consequences. More than half of the women had a history of previous uterine surgery, mostly cesarean section, half were referred, most ruptures were complete, hysterectomy was frequently required, maternal anemia was common, maternal mortality reached 11.5%, and perinatal mortality 65.4%. Taken together, these findings depict late, severe presentation and are broadly consistent with reports from LMICs, especially sub-Saharan Africa, where uterine rupture continues to reflect weaknesses in health systems. In Ethiopian evidence syntheses, uterine rupture remains strongly associated with high maternal and perinatal mortality, and pooled maternal death after rupture has been estimated at about 7.75% in some settings [25-27].

The predominance of women with a previous uterine scar in our study is consistent with the current literature. Across LMICs, prior cesarean delivery is one of the most consistent predictors of rupture, especially when labor is prolonged, poorly monitored, or managed outside facilities with immediate operative capacity. A WHO multicountry analysis among women with previous cesarean section confirmed that rupture remains an important source of severe maternal and neonatal morbidity, while a descriptive international survey also showed large between-country differences, with higher

burdens in lower-resource settings. Similar findings from Ethiopia, Senegal, and Mali reinforce that scarred uterus, obstructed labor, delayed transfer, and limited emergency obstetric readiness remain central drivers in African settings [27-31].

Our operative findings also suggest advanced disease at the time of laparotomy. The very high proportion of complete rupture and the frequent need for hysterectomy indicate that conservative repair was often no longer feasible. This pattern has been described repeatedly in LMIC hospital series and meta-analyses, where women often arrive after prolonged labor, hemorrhage, fetal compromise, or failed management elsewhere. Studies from Ethiopia and Pakistan similarly report high rates of complete rupture, hysterectomy, severe blood loss, and poor fetal outcome once diagnosis is delayed [25-32].

The maternal complications in our study, especially anemia, fit well with the established literature. Ethiopian studies have reported substantial burdens of anemia, shock, sepsis, fistula, and maternal death after uterine rupture, while a Ugandan maternal death review emphasized that many deaths followed delayed recognition, delayed surgery, and delayed blood replacement. These reports support your finding that uterine rupture in LMICs is rarely an isolated intraoperative event; rather, it is often the final expression of accumulated delay across the care pathway [26-34].

The perinatal outcome in our series was particularly poor, with 65.4% perinatal death. Although lower than the extreme values reported in some African cohorts, it still indicates a major burden of preventable fetal loss. In Debre Markos, Ethiopia, fetal outcome after rupture was grave, with stillbirth approaching totality in one hospital-based series, and broader syntheses from Ethiopia have also shown very high perinatal mortality following rupture. This contrast with high-resource settings, where continuous intrapartum monitoring and rapid decision-to-delivery intervals are more achievable, underscores the importance of early recognition and expedited intervention [26-29].

Our bivariate analysis is worth highlighting carefully. For neonatal death, several point estimates suggest possible associations, but the estimates are imprecise. Maternal age 25-30 years had an OR of 3.33 (95% CI 0.32-34.12), age 30-35 years had an OR of 0.26 (95% CI 0.04-1.64), pauciparity had an OR of 4.36 (95% CI 0.43-43.72), and referred admission had an OR of

1.40 (95% CI 0.27–7.13). These confidence intervals are very wide and all cross 1.0, meaning the data are compatible both with an increased risk and with no clear difference. The lack of statistical significance therefore should not be interpreted as evidence of no association; rather, it more likely reflects limited precision most likely due to the small sample size, that would obscure subgroup comparisons and make odds-ratio estimates unstable. Statistical literature shows that sparse data and few events commonly produce inflated or unstable ORs with wide confidence intervals, and low event counts reduce power to detect true differences [35–37].

In practical terms, the odds ratios in our tables VI - VIII should therefore be interpreted as directional signals rather than definitive effect estimates. For example, the OR above 1 for referred women may suggest worse neonatal prognosis among transferred patients, but the interval 0.27–7.13 is too wide to establish a reliable independent association. The same applies to pauciparity and some maternal age groups: the point estimates look suggestive, but the uncertainty is too great for firm conclusions. A larger multicenter study with more events, fewer fragmented categories, and multivariable modeling would be better positioned to determine whether these observed trends are real.

CONCLUSION

Our study adds valuable evidence from Cameroon showing that uterine rupture in our setting remains a severe obstetric emergency associated with non-negligible maternal morbidity and extremely poor neonatal outcomes. Most cases occurred in women with previous uterine surgery and frequently required radical surgical management. Despite exploring several maternal characteristics, no statistically significant associations with neonatal death were identified, likely due to the small sample size and limited statistical power. Strengthening antenatal risk identification, improving intrapartum monitoring—particularly in women with previous cesarean sections—and ensuring timely referral and access to comprehensive emergency obstetric care are essential to reduce the burden of uterine rupture and improve maternal and neonatal outcome linked to previous uterine scar, severe intraoperative lesions, radical surgery, maternal anemia, maternal death, and very high perinatal loss.

Conflict of Interest: The authors declare that they have no conflicts of interest regarding the publication of this paper.

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