INCIDENCE AND MATERNAL-PERINATAL OUTCOMES OF UTERINE RUPTURE IN HIWOT FANA COMPREHENSIVE SPECIALIZED UNIVERSITY HOSPITAL: A RETROSPECTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND: Uterine rupture remains a significant public health concern in many developing countries, including Ethiopia. Understanding its incidence and associated maternal and perinatal outcomes is essential for developing effective prevention and management strategies.

OBJECTIVE: To assess the incidence, trends, and maternal and perinatal outcomes of uterine rupture among women who gave birth at Hiwot Fana Comprehensive Specialized University Hospital.

METHODS: A retrospective, facility-based cross-sectional study was conducted from October 1 to 31, 2023, including all women who gave birth at Hiwot Fana Comprehensive Specialized University Hospital between January 1, 2018, and December 31, 2022. Data were collected by reviewing medical records using a structured and pretested checklist. The information was coded, cleaned, and entered into EpiData version 4.6, then exported to SPSS version 26 for statistical analysis. The results were summarized and presented in tables and figures.

RESULTS: Out of 24,608 deliveries recorded during the study period, 168 cases of uterine rupture were identified, corresponding to an incidence rate of 6.8 per 1,000 births. Over the five-year period, there were no significant changes in the trend of uterine rupture incidence. Among the 153 cases with complete information, there were 119 stillbirths (90.8%), 113 cases of severe hemorrhage (73.9%), 79 hysterectomies (51.6%), 13 bladder ruptures (8.5%), 9 cases of obstetric fistula (5.9%), and 5 maternal deaths (3.3%).

CONCLUSION: Although relatively infrequent, uterine rupture is associated with substantial adverse maternal and perinatal outcomes. Regular audits to evaluate the timeliness and quality of obstetric care are essential to prevent such complications and maternal and perinatal deaths.

KEYWORDS: Uterine rupture, incidence, trends, maternal deaths, perinatal deaths, Ethiopia

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INTRODUCTION

Although the estimated 287,000 global maternal deaths in 2020 represent a 34% reduction since 2000[1], this still highlights the long journey ahead to achieve the global target of fewer than 70 maternal deaths per 100,000 live births by 2030 [2]. Moreover, low- and middle-income countries account for 74% of the global maternal mortality burden[1]. In many low-resource settings, such as Ethiopia, direct obstetric causes—including hemorrhage, hypertensive disorders of pregnancy, and uterine rupture—are the leading contributors to maternal deaths[3].

Uterine rupture, defined as the loss of uterine wall integrity during pregnancy, labor, or shortly after delivery, remains one of the top five direct causes of maternal death in Ethiopia[4]. Beyond its impact on maternal morbidity and mortality, uterine rupture also poses serious risks to fetal health, contributing to 52% of perinatal mortality cases[5]. Factors such as obstructed labor, previous uterine scars, short interpregnancy intervals, multigravidity, lack of antenatal care, long distances from health facilities, weak referral systems, and home deliveries have been identified as major contributing factors[6].

Although uterine rupture continues to be one of the leading causes of maternal death with severe adverse outcomes, its incidence over time and patterns of maternal and perinatal outcomes are not well studied in eastern Ethiopia. Moreover, this study may assist the regional health bureau in implementing a strategic plan to minimize the incidence of uterine rupture during antenatal care and the perinatal period through quality obstetric care. This study reports the incidence, as well as the maternal and perinatal outcomes, of uterine rupture among women who gave birth at a university hospital in eastern Ethiopia.

Methods

Study setting and design

A retrospective, facility-based cross-sectional study was conducted at Hiwot Fana Comprehensive Specialized University Hospital, located in eastern Ethiopia, approximately 526 kilometres from Addis Ababa. As the primary referral and academic medical centre in the region, the hospital serves a population of over five million. During the study period, the hospital was staffed by 22 gynaecologists and obstetricians, including seven subspecialists, as well as 35 residents and 60 midwives. The study was conducted in the Department of Obstetrics from 1 to 31 October 2023.

Sample size, populations and sampling procedures

The sample size was calculated using a single population proportion formula, with the incidence of uterine rupture set at 9.5%[(7)], a 95% confidence level, a margin of error of 4%, and a nonresponse rate of 5%. This study considered only five years of maternal data to minimise data loss. However, since the number of cases in the source population over the past five years was less than the calculated sample size (227), all women with uterine rupture were included in the study.

The source population consisted of all women who gave birth in the hospital during the study period, while the study population included all women who experienced uterine rupture. Women with incomplete data on maternal and perinatal outcomes (including maternal death, surgical procedures, blood loss, and fetal/neonatal status at discharge) were excluded.

Operational definition

Uterine rupture: A tear in the uterine wall, diagnosed by physicians using signs, symptoms, and ultrasound during pregnancy, labour and delivery, and the postpartum period[8].

Adverse maternal outcomes: Defined as any of the following conditions: severe blood loss, ruptured bladder, obstetric fistula, hysterectomy, or maternal death[9].

Adverse perinatal outcomes: Refers to stillbirth, low birth weight, preterm birth, perinatal asphyxia, or neonatal death confirmed by physicians[10].

Severe haemorrhage: Bleeding necessitating transfusion of two or more units of whole blood[11].

Data collection

Data were collected through a review of women's medical records using a pretested checklist adapted from various sources in the literature[7,12–14]. Information on socio-demographic characteristics, obstetric and reproductive health-related conditions, referral status, and maternal and perinatal complications was gathered by four trained midwives under the supervision of a senior resident in obstetrics and gynaecology.

Data quality

A two-day training session was conducted for data collectors and supervisors to familiarise them with the study objectives and data collection procedures. To ensure data quality, a pretest was carried out on 5% of the study population at Jugol General Hospital. The completeness and consistency of the collected data were reviewed daily by the supervisor and the principal investigator, with corrective actions taken as necessary. Additionally, double data entry was performed to minimise errors.

Data processing and analysis

The data were coded and entered into EpiData version 4.6, then cleaned and exported to SPSS version 26 for analysis. The results are presented as frequency distributions in tables, graphs, and figures. The dependent variables were uterine rupture (yes or no) and maternal and perinatal outcomes (adverse or not adverse). Adverse maternal and perinatal outcomes included severe blood loss, ruptured bladder, obstetric fistula, hysterectomy, maternal death, stillbirth, and neonatal death.

Results

Socio-demographic characteristics

Over the five-year period, there were 24,608 births at the hospital, of which 168 involved uterine rupture. A total of 153 cases with available data on maternal and perinatal outcomes were included in the study. The mean age of the women was 27.76 ± 5.25 years. More than one-third (35.3%) had attended four or more antenatal care visits, and 66 women (43.1%) had a parity of five or more. Additionally, over three-fourths (117, 76.5%) of the uterine rupture cases occurred in women with no previous uterine scar.

In terms of perinatal outcomes, vertex presentation was observed in 117 cases (76.5%), while normal birth weight (2,500–3,900 grams) was recorded in 115 cases (75.2%) (Table 1).

Table 1: Socio-demographic and Obstetric characteristics of women with uterine rupture at HFCSUH, 2023 (n=153).

Variables	Categories	Frequency (n)	Percentage (%)
Marital status	Single	4	2.6
	Married	149	97.4
Maternal age	< 20 years	21	13.7
	20- 34 years	106	69.2
	≥35 years	26	17
Parity	Null	3	2
	1-3	52	34
	4-5	32	20.9
	>5	66	43.1
ANC visit	No	9	5.9
	1	12	7.8
	2	50	32.7
	3	28	18.3
	≥4	54	35.3
Fetal presentation	Vertex	117	76.5
	Breech	8	5.2
	Face/brow	4	2.6
	Unknown	24	15.7
Birth weight (grams)	< 2500	17	6.7
	2500-3900	115	45.5
	≥4000	21	8.3
Pervious uterine scar (C/S)	Yes	36	23.5
	No	117	76.5
Mode of delivery	Spontaneous vaginal delivery	2	1.3
	C/S (Laparotomy)	149	97.4
	Other(destructive)	2	1.3
Augmentation/ induction of labor	Yes	1	0.7
	No	152	99.3
Types of pregnancy	Singleton	151	98.7
	Multiple	2	1.3
Obstructed labor	Yes	47	30.7
	No	106	69.3
Referral status	Self-referral	8	5.2
	From other Hospital	124	81.0
	From health center	21	13.7

Incidence and trends of uterine rupture

The incidence of uterine rupture during the study period was 6.8 per 1,000 births (168 out of 24,608 deliveries). Overall, there was no significant decline in the trend of uterine rupture, with 7.9 cases per 1,000 deliveries in 2018 and 6.2 cases per 1,000 in 2020 (Figure 1).

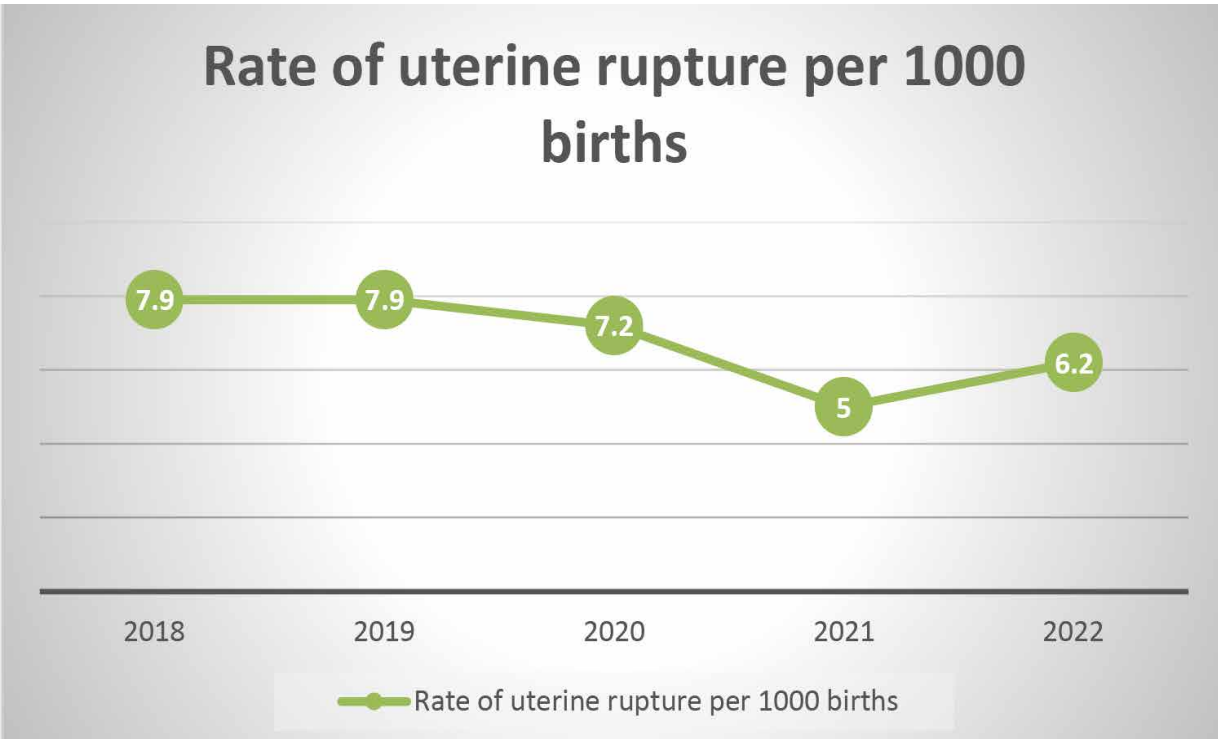

Figure 1: Trend of uterine rupture at HFCSUH from 2018 to 2022

Maternal and perinatal outcomes

Approximately three-fourths (73.9%) of the women experienced severe blood loss, defined as the transfusion of at least two units of blood. Additionally, 13 women (8.5%) had bladder rupture, and 9 (5.9%) developed obstetric fistula. Hysterectomy was performed in 79 cases (51.6%), and 5 women (3.3%) died, resulting in a case fatality rate of 3.3%. Nearly nine out of ten births (90.8%) resulted in stillbirth, and among the newborns who were alive at birth, 4 (28.6%) died before discharge (Table 2).

Table 2: Maternal and perinatal outcomes of CUR at HFCSUH from 2018 to 2022 (n=153).

Variables		Frequency (n)	Percentage (%)
Severe blood loss	Yes	113	73.9
	No	40	26.1
Bladder rupture	Yes	13	8.5
	No	140	91.5
Hysterectomy	Yes	79	51.6
	No	74	48.4
Type of hysterectomy	Total abdominal hysterectomy	66	43.1
	Subtotal Abdominal hysterectomy	13	8.5
	Repair without bilateral tubal ligation	61	39.9
	Repair with bilateral tubal ligation	13	8.5
Vesico vaginal fistula	Yes	9	5.9
	No	144	94.1
Maternal death	Yes	5	3.3
	No	148	96.7
Fetal condition at birth	Alive	14	9.2
	Stillbirths	139	90.8
Neonatal condition at discharge	Alive	10	71.4
	Dead	4	28.6

Discussion

This study evaluated the incidence and trends of uterine rupture, as well as the associated maternal and perinatal outcomes, over a five-year period at HFCSUH in eastern Ethiopia. The findings revealed an incidence of 6.8 per 1,000 live births. Despite improvements in healthcare services in Ethiopia, such as antenatal care, contraceptive use, and institutional delivery, there has been no significant change in the trend of uterine rupture over the past five years in the region[15,16]. Furthermore, 77% of cases occurred in women without prior uterine scarring, suggesting limited progress in healthcare utilisation among pregnant women in eastern Ethiopia. This may be attributed to one or more of the "three delays": delays in seeking healthcare, delays in transportation, or delays in receiving care at a facility[17].

This finding is lower than reports from teaching hospitals in southern[14] and southwestern Ethiopia[18], but higher than those from Brazil[19] and the WHO multicountry study[13]. Differences in study design, access to healthcare, demographic factors[20], urban–rural disparities, delays in seeking or reaching care, and quality of care may account for these variations[21–23].

The high burden of adverse maternal and perinatal outcomes is concerning. Three out of four women experienced severe haemorrhage, and nine out of ten had stillbirths. Although not unexpected—given the frequent late arrival of patients—it underscores the urgent need for enhanced outreach programmes and stronger referral systems. As a university medical centre, the hospital routinely sends residents to support lower-level facilities in managing emergency obstetric conditions, including timely referrals when necessary[24]. Strengthening the referral system through early communication, accompanied transfers, and family education about the urgency of obstetric emergencies is vital to preventing maternal mortality[25,26]. Furthermore, assessing the timeliness and appropriateness of care upon arrival at the hospital is essential[27].

Although the incidence of uterine rupture appears relatively low compared to other settings[14], the absence of a significant decline over time and its strong association with adverse outcomes remains troubling. To reduce maternal and neonatal mortality, it is critical to identify and address common bottlenecks, such as home-based labour, weak referrals, poor quality of care, and treatment delays. The authors emphasise the importance of auditing these cases to uncover modifiable factors at the individual, health system, and provider levels, enabling the implementation of tailored interventions.

A limitation of this study is its retrospective design. Variables such as maternal weight, height, BMI, and educational status were not recorded in the medical files and could not be assessed. Although a sample size calculation was performed during the proposal stage, all uterine rupture cases over the five-year period were included. Additionally, factors influencing the incidence and maternal–perinatal outcomes of uterine rupture were not analysed in this study.

Conclusion

Although the incidence of uterine rupture is relatively low, it is associated with high rates of adverse maternal outcomes, such as hysterectomy, bladder rupture, obstetric fistulas, and maternal death. Moreover, 90% of the pregnancies result in stillbirth, significantly affecting the psychosocial well-being of the women affected. Auditing the timeliness and appropriateness of care is essential to prevent uterine rupture and mitigate its severe maternal and perinatal consequences.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki[28]. Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee of the College of Health and Medical Sciences, Haramaya University, Ethiopia (Ref. No: IHRERC/175/2023). Prior to the study, voluntary, written, and signed informed consent was obtained from the medical director of HFCSUH, as well as the heads

of the obstetrics and gynaecology departments and the maternity ward. Medical records were reviewed in a private room, and no personal identifiers were collected. All information obtained from medical records and individuals was handled anonymously and kept strictly confidential.

Consent for publication

Not applicable.

Declaration of conflicting interest

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Availability of data and material

All data generated or analysed for this objective are included in this article, and non–person-identifying data can be accessed from the corresponding author upon reasonable request.

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Abbreviations

ANC: Antenatal care
C/S: Caesarean section
HFCSUH: Hiwot Fana Comprehensive Specialized University Hospital

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Author contributions

FA: Conceptualisation; Investigation; Methodology; Formal analysis; Writing – review & editing.
TGE: Conceptualisation; Supervision; Investigation; Methodology; Review & editing; Read and approved the final manuscript.
BB: Methodology; Data curation; Formal analysis; Writing – original draft; Read and approved the final manuscript.
AKT: Conceptualisation; Supervision; Methodology; Review & editing; Read and approved the final manuscript.

Statements and declarations

Not applicable.

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