

STUDY OF PREDISPOSING FACTORS OF RUPTURED UTERUS IN MARDAN MEDICAL COMPLEX

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Abstract

Background: Uterine rupture is a critical obstetric complication that significantly contributes to maternal and fetal morbidity and mortality. Various factors, such as previous cesarean sections, preterm deliveries, and unbooked cases, are commonly associated with an increased risk of uterine rupture. Identifying these predisposing factors and understanding their impact can help in improving outcomes through early diagnosis and management, especially in resource-limited settings.

Objective: To determine the predisposing factors associated with uterine rupture and evaluate their relationship with demographic characteristics.

Study Design: Cross-sectional study.

Duration and Place of Study: The study was conducted from October 2024 to March 2025 at the Department of Obstetrics and Gynaecology, Mardan Medical Complex, Mardan.

Methodology: A total of 214 women aged 18 to 40 years, with a singleton pregnancy and a gestational age of more than 30 weeks, were enrolled in the study. Data on demographic characteristics, predisposing factors (previous C-section, preterm delivery, and unbooked cases), and their association with age, gestational age, and parity were collected and analyzed.

Results: The average age of participants was 30.23 ± 4.84 years, with an average gestational age of 37.67 ± 1.58 weeks and an average parity of 2.76 ± 1.47 . Previous C-section was present in 42.5% of the cases, preterm delivery in 25.2%, and unbooked cases in 76.2%. A significant association was found between preterm delivery and gestational age ($p < 0.001$), with all preterm deliveries occurring in women with a gestational age of less than 37 weeks.

Conclusion: This study concludes that previous C-section, preterm

delivery, and unbooked cases are major predisposing factors for uterine rupture.

INTRODUCTION

A ruptured uterus is an uncommon but potentially life-threatening obstetric complication comprising a tear in the uterine wall, which may happen in labor or delivery. If left undiagnosed and treated, a ruptured uterus causes serious maternal and obstetric complications.¹ It can occur over a pre-existing scar, as in a previous cesarean delivery or other uterine operations, or spontaneously when no uterine cut exists.² Rupture can lead to massive hemorrhage, fetal loss, and maternal mortality. It occurs predominantly in the context of cesarean-induced pregnancies, especially when a history of uterine operations exists.²

Symptoms and clinical manifestations associated with a ruptured uterus are varied and quite often non-characteristic, making early detection difficult.³ Sudden, severe abdominal pain that is not characteristic of normal labor pains, vaginal bleeding, and alterations in the pattern of fetal heart rates such as bradycardia or decelerations are the more frequently encountered clinical findings.³ Shock resulting from intraperitoneal hemorrhage may occur in some instances with the mother's presentation as hypotension, tachycardia, and pallor.⁴ A palpable presenting part outside the uterus or an abnormal Bandl's ring on retraction may be seen.⁴ Whether the rupture is complete or incomplete, the clinical presentation often varies, with complete ruptures often presenting with more dramatic findings.⁵ Early detection of the clinical findings helps avoid further complications because delay in intervention leads to increased rates of both maternal and fetal morbidity and mortality.⁵

A variety of predisposing conditions contribute to the risk for uterine rupture, a large proportion of which is related to the integrity of the uterine wall. Among the risk factors is prior cesarean delivery, especially if the cut had been vertical through the top of the uterus instead of a cross-section across the lower uterine segment.⁶ Other surgical operations, including the removal of uterine fibroids by myomectomy, similarly weaken the integrity of the uterine wall and predispose the patient to rupture.⁶ Furthermore, conditions that lead to excessive

uterine distension, such as macrosomia, polyhydramnios, or multiple gestation, subject the uterine walls to excessive stress and thereby increase the risk.⁷

Induction with medications such as oxytocin or prostaglandin further exacerbates the risk, particularly in women with a previous uterine scar.⁸ Advanced maternal age, multiparity, and prolonged labor have all been associated with a higher risk of uterine rupture.⁹ In women in low-resource settings, additional risks may be associated with decreased access to quality antenatal and intrapartum care, resulting in delayed clinical diagnoses and inadequate labor management.⁹ In addition, misuse of assisted reproductive technologies (ART) or a failure in the spacing between pregnancies can further precipitate the stress on the uterine wall.¹⁰ All these risk factors highlight the need for diligent antenatal care and cautious labor management decisions in women with a high-risk pregnancy.

In a study by Turgut A, et al. has shown that frequency of previous C-section was 31.1% in patients with ruptured uterus.⁶ In another study by Kahansim ML, et al. has shown that frequency of preterm delivery was 16.7% and unbooked cases was 70.8% in patients with ruptured uterus.¹¹

No such study has been conducted before in our local population. Using a systematic analysis of the factors for uterine rupture, this research strives not only to generate useful information that can be used in early risk stratification, early clinical decision-making, and the development of evidence-based protocols for safer maternal and fetal outcomes but, more importantly, by recognizing the risky cases early and using prevention, can diminish the obstetric complication's impact significantly, thus making maternal health care better and perinatal loss lesser.

MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Mardan Medical Complex Mardan, from October 2024 to March 2025. A total sample size of 214 was determined using the WHO sample size calculator,

with a 95% confidence interval, a 5% margin of error, and an anticipated frequency of preterm delivery in patients with ruptured uterus of 16.7%.¹¹

The study included women aged 18 to 40 years, with a singleton pregnancy confirmed by ultrasound and a gestational age greater than 30 weeks based on the last menstrual period (LMP). Participants were required to have any parity and meet the criteria for a ruptured uterus, which was defined as the disruption or tear of the uterine muscle and visceral peritoneum, or a separation of the uterine muscle extending to the bladder or broad ligament, as confirmed through physical examination. Women with asymptomatic scar dehiscence or who were referred from other facilities were excluded.

Demographic information such as age, gestational age, and parity was recorded. The predisposing factors considered for the study included a history of previous C-sections, which was recorded if it was documented in the patient's medical record; preterm delivery, defined as the birth of a live baby between 24 to 32 weeks of gestation; and unbooked cases,

which referred to patients who had not received antenatal care throughout the pregnancy. All data was recorded on a specially designed proforma by the researcher.

The data was analyzed using IBM SPSS version 25. Continuous variables such as age, gestational age, and parity were expressed as means with standard deviations, while categorical variables like previous C-sections, preterm delivery, and unbooked cases were reported as frequencies and percentages. Stratification of predisposing factors was performed by age, gestational age, and parity. The post-stratification analysis involved applying the chi-square test, with a significance level set at $p \leq 0.05$.

RESULTS:

Table I reports the mean and standard deviation (SD) for the demographics of the study population: the average age of participants is 30.23 ± 4.84 years, the average gestational age is 37.67 ± 1.58 weeks, and the average parity is 2.76 ± 1.47 .

Table I: Mean±SD of patients according to age, gestational age and parity

Demographics		Mean±SD
1	Age (years)	30.23±4.84
2	Gestational age (weeks)	37.67±1.58
3	Parity	2.76±1.47

Table II presents the distribution of predisposing factors for ruptured uterus among 214 patients: previous C-section was noted in 42.5% of cases,

preterm delivery in 25.2%, and unbooked cases in 76.2%.

Table II: Predisposing factors of ruptured uterus n=214

Predisposing Factors	Frequency	%age
Previous C-section	91	42.5%
Preterm delivery	54	25.2%
Unbooked cases	163	76.2%

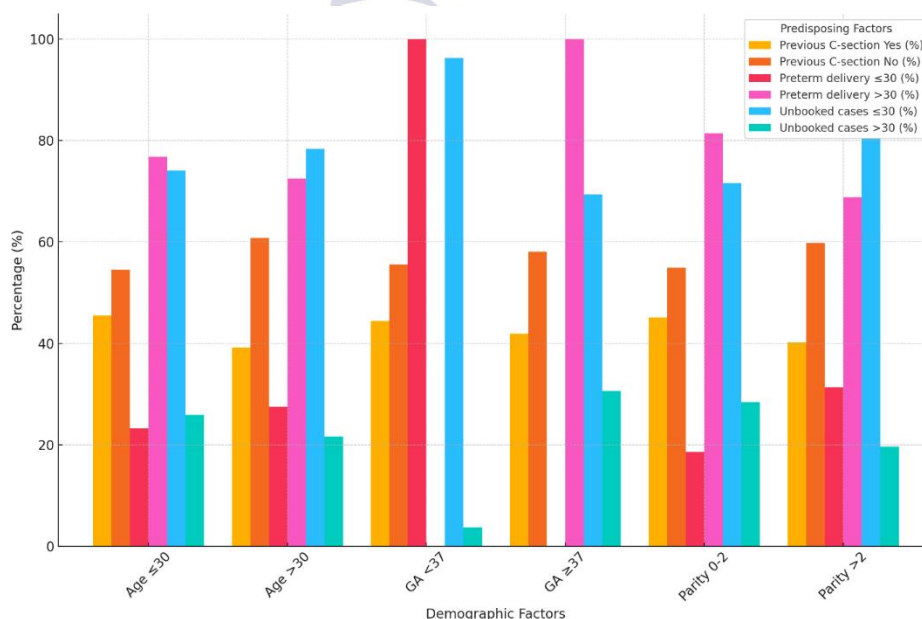
Table III presents the association of predisposing factors with demographic characteristics. For previous C-section, there is no significant age difference ($p = 0.350$), gestational age ($p = 0.741$), or parity ($p = 0.467$). However, for preterm delivery, the results indicate a significant association with gestational age ($p < 0.001$), where all preterm deliveries occurred in women with gestational age less than 37 weeks, and with parity ($p = 0.034$), with

higher proportions of preterm deliveries in women with parity greater than 2. For unbooked cases, no significant association was found with age ($p = 0.458$) or parity ($p = 0.132$), but there was a significant association with gestational age ($p < 0.001$), where a majority of unbooked cases were delivered at gestational ages less than 37 weeks as shown in Graph-I.

Table-III: Association of Predisposing Factors with Demographic Factors

Demographic Factors		Previous C-section		p-value
		YES n(%)	NO n(%)	
Age (years)	≤30	51(45.5%)	61(54.5%)	0.350
	>30	40(39.2%)	62(60.8%)	
Gestational age (weeks)	<37	24(44.4%)	30(55.6%)	0.741
	≥37	67(41.9%)	93(58.1%)	
Parity	0-2	46(45.1%)	56(54.9%)	0.467
	>2	45(40.2%)	67(59.8%)	
Preterm delivery				
Age (years)	≤30	26(23.2%)	86(76.8%)	0.476
	>30	28(27.5%)	74(72.5%)	
Gestational age (weeks)	<37	54(100%)	0(0%)	<0.001*
	≥37	0(0%)	160(100%)	
Parity	0-2	19(18.6%)	83(81.4%)	0.034
	>2	35(31.3%)	77(68.8%)	
Unbooked cases				
Age (years)	≤30	83(74.1%)	29(25.9%)	0.458
	>30	80(78.4%)	22(21.6%)	
Gestational age (weeks)	<37	52(96.3%)	2(3.7%)	<0.001*
	≥37	111(69.4%)	49(30.6%)	
Parity	0-2	73(71.6%)	29(28.4%)	0.132
	>2	90(80.4%)	22(19.6%)	

*Fischer Exact Test



Graph-I: Stratification of Predisposing Factors with Demographic Factors

DISCUSSION

The previous C-section history was revealed to be a common risk factor, identified in 42.5% of the cases,

which is in agreement with literature that associates increased cesarean sections and uterine rupture risk. It is predominantly due to weakening of the uterine

wall in previous surgery, causing the uterine structure to lose integrity in subsequent pregnancies.

The high correlation between preterm delivery and gestational length ($p < 0.001$) suggests that women with preterm delivery (before 37 weeks) are susceptible to uterine rupture. Preterm labor is perhaps a result of the underdevelopment of uterine and cervix tissue that can lead to uterine instability during contraction and subsequent rupture.

Unbooked cases were much higher in women who had given birth before 37 weeks of gestation ($p < 0.001$). It highlights the issue of improper high-risk pregnancy management in a well-organized and systematic manner, leading to delayed intervention and augmented complications' risks, including uterine rupture.

Our study results reveal that the average age of participants was 30.23 ± 4.84 years, the average gestational age was 37.67 ± 1.58 weeks, and the average parity was 2.76 ± 1.47 . These values reflect a population of women with a moderate age and parity, similar to the findings in other studies, where uterine rupture was most common in multiparous women (e.g., Saleem et al.¹² found that 80% of their cases were multiparous). The average age in our study (30.23 years) aligns with the findings of Tabassum et al.¹³ where most cases occurred in women aged between 25-29 years. In contrast, Turgut et al.¹⁴ observed a higher incidence in women with increased maternal age, reflecting differences that may be attributed to varying socioeconomic conditions and healthcare accessibility.

In terms of predisposing factors, our study identified that 42.5% of cases had a history of previous cesarean section, which is consistent with findings from other studies, particularly those by Saleem et al.¹² and Abrar et al.¹⁵ where previous cesarean section was identified as a major risk factor. However, our study also highlights the significant presence of unbooked cases (76.2%), which may reflect the challenges of healthcare access, especially in low-resource settings, as indicated by Motomura et al.¹⁶ who found a higher incidence of uterine rupture in low-HDI countries. This could explain the higher proportion of unbooked cases in our study compared to others, such as those by Turgut et al.¹⁴ where the incidence was lower and more controlled due to better antenatal care and referral systems.

The association of predisposing factors with demographic characteristics in our study reveals significant findings. For instance, we found that preterm delivery was significantly associated with gestational age ($p < 0.001$), with all preterm deliveries occurring in women with a gestational age of less than 37 weeks. This mirrors findings from Abrar et al.¹⁵ and Saleem et al.¹² where preterm delivery was also significantly associated with uterine rupture. Furthermore, we observed a significant association between parity and preterm delivery ($p = 0.034$), with higher proportions of preterm deliveries in women with higher parity. This result corroborates findings by Tabassum et al.¹³ where the association of multiple pregnancies with uterine rupture was highlighted, although other studies like Turgut et al.¹⁴ did not emphasize parity as a significant risk factor. In our study, we also investigated the association of unbooked cases with demographic characteristics and found a significant relationship with gestational age ($p < 0.001$), with the majority of unbooked cases delivering before 37 weeks of gestation. This result aligns with findings from both Abrar et al.¹⁵ and Saleem et al.¹² where unbooked status was frequently associated with adverse outcomes, especially in cases of preterm deliveries and obstructed labor. These findings underline the critical need for early antenatal care and timely referrals, especially for high-risk pregnancies.

In comparison to studies in high-resource settings, such as those by Motomura et al.¹⁶ and Turgut et al.¹⁴ where risk factors such as previous cesarean section were predominant, our study emphasizes the high prevalence of unbooked cases and the association with preterm deliveries, reflecting the disparities in healthcare access and prenatal care quality. The studies conducted in low-resource settings, including ours, highlight that lack of prenatal care, unskilled birth attendants, and delayed hospital referrals are significant contributors to uterine rupture. This is particularly evident in the higher maternal mortality and perinatal mortality rates observed in our study, which also align with findings from Abrar et al.¹⁵ and Saleem et al.¹²

The dominance of unbooked cases and preterm birth in this study highlights the condition of women without adequate prenatal care, demanding particular healthcare strategies in addressing these

disparities. These findings emphasize the necessity of critical roles of antenatal care, delivery in institutions, and also of emergency obstetric care in the prevention of uterine rupture and in lessening the danger related to it.

In spite of that, we recognize that our study is limited in that it may or may not be representative of the larger population as a single-center study, particularly in institutions that have diverse healthcare infrastructures. It is predicated on one particular set of demographic and clinical parameters that may or may not be generalized across all settings. Lastly, the study's retrospective design means that it is limited in controlling for confounding variables and that data collection was subject to the availability of resources and the imperfections of practice. Future multicenter and prospective studies will be needed to validate these data and to better understand the risk factors and outcomes of uterine rupture in all healthcare settings.

CONCLUSION:

Our study concludes that rupture of the uterus remains a life-threatening obstetric complication that is predominantly associated with previous cesarean delivery, preterm delivery, and unbooked cases. It highlights the importance of improved antenatal care, early referral, and skilled delivery in a quest to reduce fetal and maternal morbidity and mortality. It highlights the need for the right interventions in low-resource settings to address these risk factors and highlights the role of early diagnosis and care in the prevention of uterine rupture.

Conflict of interest: None

Disclaimer: None

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