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Original Research Article

Stitch in time saves nine: a retrospective study of uterine rupture over two years at a tertiary care hospital, Jabalpur

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ABSTRACT

Background: Uterine rupture remains a critical obstetric emergency with unpredictable presentations and significant maternal-fetal risks. While often associated with prior caesarean sections, recent evidence points to a rising trend in unscarred ruptures in developing regions. This study aims to assess the incidence, risk profile, and outcomes of uterine rupture over a two-year period at a high-volume referral centre, identifying preventable gaps in care.
Methods: A retrospective observational study was conducted at Netaji Subhash Chandra Bose Medical College, Jabalpur, from April 2022 to March 2024. All women with complete uterine rupture in the second or third trimester were included. Data on demographics, obstetric history, rupture site, surgical management, and maternal-fetal outcomes were analysed. Preventive factors such as antenatal care and referral delays were also examined.
Results: Among 20,064 deliveries, 39 cases of uterine rupture were identified (1.94/1000). Of these, 61.5% occurred in scarred uteri and 38.5% in unscarred. Key contributing factors included short inter-delivery intervals, prolonged labour, previous uterine evacuation, and delayed referrals. Primary repair was performed in 71.8% of cases; hysterectomy and bladder repair were required in others. Maternal complications included anaemia, infection, and wound issues. The stillbirth rate was 74.4%, often linked to delayed presentation.
Conclusions: In addition to known risk factors, poor spacing, unregulated uterotonic use, and systemic referral delays contribute significantly to uterine rupture. Strengthening antenatal counselling, timely referral mechanisms, and obstetric preparedness at peripheral levels is essential to reduce the burden of this preventable emergency.

Keywords: Uterine rupture, Unscarred uterus, Caesarean section, Maternal morbidity, Obstetric risk factors, Tertiary care hospital

INTRODUCTION

Uterine rupture is a rare but catastrophic obstetric emergency that poses significant risks of maternal and fetal morbidity and mortality. It is defined as a complete separation of the uterine wall layers, including the serosa, often leading to life-threatening hemorrhage, fetal expulsion into the peritoneal cavity, and severe maternal complications. When the visceral peritoneum remains intact, it is termed an incomplete rupture.[1]

Globally, the incidence of uterine rupture varies depending on healthcare infrastructure and obstetric practices.

According to the World health organization (WHO), its prevalence is approximately 0.053% in community settings and 0.31% in institutional deliveries.[2] While the overall risk in scarred uteri is under 1%, the condition is exceedingly rare in unscarred uteri, with an incidence of 0.006%.[2]

In India, rising cesarean section rates from 8.5% in National Family Health Survey (NFHS-3: 2005–06) to 21.5% in NFHS-5 (2019–21) along with increased use of uterotonics, trans-myometrial surgeries (e.g., myomectomy), induction of labour, and advanced maternal age have contributed to a growing incidence of uterine rupture.[3] Additionally, healthcare disparities, long referral distances, and delays in timely intervention increase adverse outcomes, particularly in rural and semi-urban populations.

Uterine rupture can occur in both scarred and unscarred uteri, and multiple risk factors have been identified: prior cesarean section or uterine surgery, obstructed labour, high parity, short inter-pregnancy interval, trauma, overuse or misuse of uterotonics (oxytocin, prostaglandins), abnormal fetal presentations, macrosomia, and congenital uterine anomalies.[4-6] In unscarred uteri, trauma, excessive uterine stimulation, multiple gestations, and congenital defects are key contributors.[5]

Diagnosis is often clinical—marked by sudden, severe abdominal pain, cessation of contractions, fetal heart rate abnormalities, vaginal bleeding, or maternal tachycardia. However, silent ruptures or atypical presentations, particularly in scarred uteri, may complicate timely recognition.[7]

The type of surgical management—ranging from primary repair with or without tubal ligation, to subtotal or total hysterectomy—depends on the extent of rupture, haemodynamic stability, desire for future fertility, and intraoperative findings such as extension to the cervix, bladder, or broad ligament.[6,8] Prompt surgical interventions, availability of blood products, anaesthesia support, and timely referral are crucial for favorable maternal and fetal outcomes.

National maternal health strategies, such as the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) and LaQshya under the National Health Mission (NHM), emphasize skilled intrapartum care, institutional deliveries, rational use of uterotonics, and timely referral to reduce preventable maternal deaths from conditions such as uterine rupture.[9,10]

Despite progress, there remains a scarcity of comprehensive regional data on uterine rupture in tertiary Indian centers. This study was undertaken to assess its incidence, risk profiles, rupture patterns, maternal and fetal outcomes, and the influence of referral-related delays on management and prognosis.

Aims and objectives

The aims and objectives of the study were to determine the incidence of uterine rupture, to evaluate maternal and fetal outcomes associated with uterine rupture, and to analyse correlations between obstetric risk factors, clinical presentation and surgical management in uterine rupture cases.

METHODS

Study type

It was a retrospective observational study.

Study place

The study was conducted at the Department of Obstetrics and Gynaecology, Netaji Subhash Chandra Bose Medical College, Jabalpur.

Study period

The duration of the study was from April 2022 to March 2024.

Inclusion criteria

All pregnant women diagnosed with complete uterine rupture during the second or third trimester, either in the antepartum or intrapartum period, who underwent surgical intervention at our institution were included.

Exclusion criteria

Cases of incomplete uterine rupture were excluded.

Procedure

Cases of uterine rupture were identified by reviewing operation theatre records, patient discharge summaries, and labor ward registers. For each confirmed case, detailed clinical information was extracted from patient files, including demographic profile, parity, gestational age, referral distance, obstetric history (including uterine scar status and inter-delivery interval), clinical presentation at admission, intraoperative findings (site and extent of rupture), type of surgical intervention performed, and maternal and fetal outcomes. Particular attention was given to factors associated with preventable delays such as late referrals, prolonged labor, and prior uterine procedures (e.g., dilatation and evacuation).

Statistical analysis

Data were entered into Microsoft Excel and analyzed using statistical package for the social sciences (SPSS) version 25. Descriptive statistics were used to summarize categorical variables as frequencies and percentages. Incidence of uterine rupture was calculated per 1,000 deliveries. No inferential tests were applied, in line with the descriptive nature of the study. Results are presented using appropriate tables and charts to highlight distribution patterns and clinical correlations.

RESULTS

During the study period, a total of 20,064 deliveries were conducted at our tertiary care center. Out of these, 39 cases of uterine rupture were recorded, yielding an incidence of 1.94 per 1,000 deliveries.

The majority of women were aged between 25 and 29 years (43.6%), followed by 30–34 years (28.2%). Most patients were from rural areas (66.7%) and were referred cases (76.9%). Parity-wise, 41% were primiparous and 35.8% were para 2. A history of abortion was noted in 30.8% of cases. Regarding gestational age, 46.2% of cases occurred beyond 37 weeks, and 25.6% were between 29 and 34 weeks (Table 1).

Table 1: Demographic and obstetric characteristics of women with uterine rupture.

Parameter	Number (N)	Percentage (%)
Age (years)		
<25	4	10.3
25-29	17	43.6
30-34	11	28.2
>35	7	17.9
Residence		
Rural	26	66.7
Urban	13	33.3
Referral status		
Referred	30	76.9
Unbooked	7	17.9
Registered	2	5.1
Parity		
Para 1	16	41
Para 2	14	35.8
Para 3	5	12.8
Para more than 4	4	10.3
History of abortion		
Yes	12	30.8
No	27	69.2
Gestational age (weeks)		
<22	1	2.6
22-28	5	12.8
29-34	10	25.6
35-37	5	12.8
>37	18	46.2

A short inter-delivery interval of ≤18 months was present in 56.4% of cases. Nearly two-thirds (61.5%) had a previous caesarean scar, while 38.5% had unscarred uteri. Twelve women (30.8%) had a prior history of dilatation and evacuation. Labour lasted less than 12 hours in 56.4% of cases, and more than 24 hours in 17.9%. Referral distance data showed that 46.7% of patients came from <50 km, while 30% travelled >100 km (Table 2).

Abdominal pain was the most common presenting symptom (64.2%), followed by bleeding per vaginum (25.7%) and absent fetal movements (20.5%). A minority presented with maternal shock (7.7%), acute cessation of contractions (7.7%), or were asymptomatic (2.6%). Since many patients had overlapping symptoms, a stacked bar chart was used to illustrate clinical presentations (Table 3).

Table 2: Key obstetric risk profiles and labour characteristics in uterine rupture cases.

Risk factors	Number (N)	Percentage (%)
Inter-delivery interval (months)		
<9	5	12.8
9-18	17	43.6
>18	17	43.6
Uterine scar status		
Unscarred uterus	15	38.5
Previous 1 LSCS	13	33.3
Previous 2 LSCS	11	28.2
History of dilatation and evacuation		
Present	12	30.8
Absent	27	69.2
Duration of labour (hours)		
<12	22	56.4
12-24	10	25.6
>24	7	17.9
Distance from referral centre (kilometers)		
<50	14	46.7
50-100	7	23.3
>100	9	30.0

Table 3: Spectrum of clinical presentation at diagnosis of uterine rupture.

Clinical presentation	Number (N)	Percentage (%)
Abdominal pain	25	64.2
Bleeding per vaginum	10	25.7
Absent fetal movements	8	20.5
Acute absence of contraction	3	7.7
Maternal shock	3	7.7
Asymptomatic	1	2.6

The most common site involved was the anterior lower uterine segment alone (23.1%), followed by its extensions to the lateral uterine wall (20.5%) and the broad ligament (10.3%). Multisite involvement was frequent, reflecting extensive uterine damage in many cases. Fundal, cervical, vaginal, and posterior segment ruptures were also documented in varying combinations (Table 4).

Primary repair was the most common surgical intervention (66.7%), followed by subtotal hysterectomy (17.9%) and total hysterectomy (10.3%). In 7.7% of cases, bladder repair was performed in conjunction with primary repair or hysterectomy (Table 4).

Table 4: Anatomical sites of uterine rupture and surgical interventions.

Parameters	Number (N)	Percentage (%)
Anatomical sites		
Anterior lower uterine segment	9	23.1
Anterior lower uterine segment with lateral wall extension	8	20.5
Anterior lower uterine segment with broad ligament extension	4	10.3
Fundus	3	7.7
Anterior lower uterine segment with vaginal and cervical extension	3	7.7
Posterior lower uterine segment with lateral wall extension	3	7.7
Anterior lower uterine segment with cervical extension	2	5.1
Posterior lower uterine segment	2	5.1
Posterior lower uterine segment with broad ligament extension	2	5.1
Lateral wall extension with broad ligament extension	2	5.1
Fundus with lateral wall extension	1	2.6
Surgical management		
Primary repair	26	66.7
Subtotal hysterectomy	6	15.4
Total hysterectomy	4	10.3
Primary repair with bladder repair	2	5.1
Subtotal hysterectomy with bladder repair	1	2.6

Table 5: Maternal and fetal outcomes following uterine rupture.

Parameters	Number (N)	Percentage (%)
Maternal outcome		
Uneventful	17	43.6
Anaemia	9	23
Urinary tract infections	5	12.8
Bladder repair	3	7.7
Puerperal fever	3	7.7
Impaired wound healing	2	5.1
Fetal outcome		
Live birth	10	25.6
Still birth	29	74.4

The clinical course was uneventful in 43.6% of patients. anaemia was the most frequent 8 complication (23%), followed by urinary tract infections (12.8%). Puerperal fever and wound healing issues occurred in 7.7% and 5.1% respectively (Table 5).

Out of 39 cases, 29 resulted in stillbirths (74.4%) and only 10 live births (25.6%) were recorded, indicating a significantly high perinatal mortality rate in uterine rupture cases (Table 5).

DISCUSSION

In this retrospective study, the incidence of uterine rupture was found to be 0.19% (39 cases out of 20,064 deliveries), which aligns with the WHO-reported incidence of 0.31% in institutional settings.[1] Compared to other Indian studies reporting incidence rates between 0.1% and 0.8%, our findings reflect a relatively lower burden.[4,6,9] This comparatively reduced incidence may be attributed to institutional protocols that emphasise timely identification of high-risk pregnancies, close monitoring of scarred uteri, and judicious obstetric decision-making. As a tertiary care referral centre, our facility adheres to structured guidelines for antenatal risk stratification, early preparedness for delivery, appropriate use of uterotonics, and preventive interventions. Family planning counselling, optimal birth spacing, and clear criteria for repeat caesarean sections have likely contributed to preventing unnecessary complications.[2]

Our study shows that uterine rupture is not limited to scarred uteri. While 61.5% of the cases occurred in women with previous caesarean deliveries, 38.5% of cases occurred in women with unscarred uteri, a proportion notably higher than earlier Indian studies ranging from 13% to 30%.[4,6,10] This rising trend is concerning and may be attributed to several interrelated factors. In our cohort, 30.8% of women had a history of dilatation and evacuation, suggesting prior uterine instrumentation, uterine anomalies, multiple gestations, macrosomia, undiagnosed malpresentation as a contributing factor. Additionally, grand multiparity, prolonged labour, and injudicious use of uterotonics often unsupervised in peripheral referral hospital can overstimulate an otherwise intact uterus, leading to rupture.[3,4] Nutritional deficiencies and delayed access to skilled obstetric care, particularly in rural and remote regions, further increase the risk. The anatomical thinning of the myometrium in multigravida women or unnoticed congenital uterine anomalies may also play a role.[5] These findings underscore the importance of strengthening regulation around uterotonic use, early referral systems, and antenatal risk stratification even in women without prior uterine surgery.

A considerable proportion of patients (30%) were referred from healthcare centres located more than 100 kilometres away, highlighting the persistent challenge of geographical inaccessibility and delay in timely referral, especially in rural and tribal regions. Such delays are

known contributors to adverse maternal outcomes in cases of uterine rupture, as timely surgical intervention is crucial to reducing morbidity and mortality.[5,8] Furthermore, the majority of patients in our study were from rural or semi-urban areas, which may reflect disparities in antenatal care coverage, availability of skilled personnel, and institutional delivery rates in peripheral regions. These findings align with national data, emphasising the rural-urban gap in emergency obstetric care utilisation.[3,9]

The inter-delivery interval was <18 months in 56.4% of the women, supporting evidence that short birth intervals are a significant risk factor for scar dehiscence and rupture.[4,9] Labour duration >12 hours was present in 43.6% of cases, consistent with obstructed labour being a contributing factor.[4]

Gestational age at presentation also showed an important trend. Most uterine ruptures occurred at term or near term (≥37 weeks), suggesting that rupture often coincides with labour onset in high-risk scenarios. However, a few cases occurred in late preterm gestation (34–36 weeks), particularly among women with prior uterine surgery or induced labour, indicating the need for vigilant monitoring during antenatal visits and during any interventions before term.

Clinically, abdominal pain (64.2%) and vaginal bleeding (25.7%) were the most frequent presenting symptoms. However, a notable proportion (7.7%) presented in maternal shock, underlines the acute and severe nature of rupture. Alertness to these signs is the key to the timely rescue and successful management. Our findings are consistent with other Indian and Southeast Asian studies reporting similar symptom patterns.[3,6]

In our study, the anterior lower uterine segment was the most frequently involved rupture site (23.1%); however, a significant proportion of cases demonstrated complex extensions into the lateral uterine wall, cervix, and even the broad ligament. These findings illustrate the unpredictable nature of uterine rupture, particularly when timely diagnosis or surgical intervention is delayed. The anatomical distortion and vascular involvement seen in such cases can pose substantial intraoperative challenges. Unlike classical textbook presentations, ruptures may not always remain confined to the lower segment, especially in grand multiparas or when previous uterine surgeries have involved non-transverse incisions or instrumentation.

From a management perspective, primary uterine repair was successfully performed in 71.8% of the patients, while 28.2% required hysterectomy, aligning with reports from other tertiary centres.[4,5,10] The decision for repair versus hysterectomy was influenced by several factors including, the extent of rupture, haemodynamic instability, presence of gross infection or contamination, and the woman's desire for future fertility. Uterine conservation was more feasible in cases where rupture was localised, bleeding was controllable, and tissue integrity was adequate. These intraoperative findings highlight the importance of ensuring surgical preparedness with availability of senior obstetricians, adequate blood products, and anaesthesia support particularly in high-risk labour cases or in referred patients with delayed presentation.

In terms of maternal outcome, 43.6% of patients had an uneventful postoperative recovery, while 23% developed anaemia and 12.8% experienced urinary tract infections. Notably, no maternal deaths occurred in our study, despite the severity of uterine rupture and its historically high maternal risk. This outcome reflects the effectiveness of timely diagnosis, rapid surgical intervention, access to blood transfusions, and well-coordinated postoperative care. The absence of maternal mortality even in complex rupture cases highlights the vital role of institutional delivery, vigilant labour monitoring, and appropriate decision-making in women with previous caesarean sections or other risk factors.

By contrast, fetal outcomes were less favourable, with a stillbirth rate of 74.4%. This is in line with earlier studies and indicates that, despite successful maternal salvage, fetal compromise often occurs before presentation or intervention, especially in cases with prolonged labour or delayed referral.[1,6]

A key strength of this study lies in its comprehensive analysis of uterine rupture cases over a two-year period in a high-volume tertiary referral centre, offering valuable insights into both scarred and unscarred uteri. Additionally, the study identifies evolving risk patterns, such as the rising incidence of rupture in unscarred uteri and cases associated with prior uterine instrumentation, which are not adequately emphasized in earlier Indian literature.[4,6,10]

However, the study is limited by its retrospective observational design. The study is also confined to a single institution, which may limit extrapolation of findings to rural or non-tertiary settings. Moreover, the absence of long-term maternal and neonatal follow-up data restricts the assessment of subsequent fertility and health outcomes.

Despite these limitations, the study contributes robust institutional data to a critically important area in maternal health, providing a foundation for strengthened risk stratification, timely referral systems, and surgical preparedness protocols in high-risk obstetric care.

CONCLUSION

Uterine rupture remains a grave obstetric emergency with significant maternal and perinatal consequences. While previous caesarean section continues to be a major contributor, the substantial proportion of cases in unscarred uteri underscores the need to address other modifiable risk factors such as injudicious use of uterotonics, grand multiparity, and delayed referrals. Strengthening the referral system, enforcing rational

labour induction protocols, and ensuring availability of skilled birth attendants are essential strategies in reducing incidence. Public health interventions focusing on improved antenatal surveillance, promotion of institutional deliveries, birth spacing, and reproductive health education are crucial to mitigate risks, especially in resource-limited settings. Multidisciplinary preparedness at tertiary centres combined with early identification of high-risk pregnancies can significantly improve maternal and fetal outcomes.

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