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Maternal and Fetal Consequences of Uterine Rupture in Scarred Vs. Unscarred Uterus

Dr. Shamim Ara[1]*, Dr. Md. Boyez Uddin[2], Dr. Jesmin Sultana[3], Dr. Liza Tasrin[4], Dr. Ayesha Siddika Purabi[5]

[1]Junior Consultant, Obstetrics and Gynecology, Directorate General of Health Services (DGHS), Dhaka, Bangladesh
[2]Assistant Professor, Department of Anesthesia, 300 Bedded Hospital, Khanpur, Narayanganj, Bangladesh
[3]Assistant Professor, Department of Gynecological Oncology, National Institute of Cancer Research and Hospital, Dhaka, Bangladesh
[4]Assistant Professor, Obstetrics and Gynecology, Bangladesh Secretariat Clinic, Dhaka, Bangladesh
[5]Assistant Professor, Department of Obstetrics and Gynecology, Dhaka Medical College Hospital, Dhaka, Bangladesh

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***Corresponding author:** Dr. Shamim Ara
Junior Consultant, Obstetrics and Gynecology, Directorate General of Health Services (DGHS), Dhaka, Bangladesh

Abstract

Background: Uterine rupture is a life-threatening obstetric emergency associated with significant maternal and fetal morbidity and mortality. Changing obstetric practices have altered its etiological profile, particularly with the rising rate of caesarean section. This study aimed to compare maternal and fetal consequences of uterine rupture in scarred versus unscarred uterus. ***Methods:*** This cross-sectional descriptive study was conducted in the Department of Obstetrics and Gynaecology, Rajshahi Medical College Hospital, Rajshahi, Bangladesh, from March to September 2012. Forty-two cases of surgically confirmed uterine rupture were analyzed with respect to demographic characteristics, risk factors, clinical presentation, surgical management and outcomes. ***Results:*** The incidence of uterine rupture was 0.96% (1 in 104 deliveries). Scarred uterus rupture accounted for 71% of cases. Most patients were aged 20–25 years, multiparous, of low socioeconomic status and unbooked for antenatal care. Repair of rupture was the most common surgical procedure (61.9%). Maternal mortality was 7.1%, while perinatal mortality was 85.7%. ***Conclusion:*** Uterine rupture is increasingly associated with previous caesarean section. Although maternal survival has improved, fetal outcomes remain poor. Strengthening antenatal care, rationalizing caesarean section practices and ensuring skilled intrapartum management are critical to prevention.

Keywords: Uterine rupture, Scarred uterus, Caesarean section, Maternal outcome, Perinatal mortality.

INTRODUCTION

Rupture of the gravid uterus remains one of the most catastrophic obstetric emergencies, with significant risks of maternal and perinatal morbidity and mortality. Despite advances in obstetric care globally, uterine rupture continues to pose a major challenge, particularly in low- and middle-income countries where access to skilled intrapartum care is often limited. The epidemiology and etiology of uterine rupture vary widely between developed and developing settings, reflecting disparities in obstetric practices, health system capacity and sociodemographic factors [1,2].

Historically, rupture of the unscarred uterus due to prolonged or obstructed labor predominated in resource-limited regions. However, with the global rise in cesarean section rates, a paradigm shift is evident, with rupture of the scarred uterus becoming a more prominent contributor. In developed countries, the prevalence of uterine rupture among women with a previous cesarean section is approximately 1%, whereas it is less than 0.1% among women without a uterine scar. Contrastingly, studies from South Asia and Sub-Saharan Africa report higher overall rates of uterine rupture, often compounded by delayed presentations and inadequate emergency obstetric services [3,4].

Bangladesh continues to bear a high burden of maternal mortality, with uterine rupture significantly contributing to preventable maternal deaths. National estimates reveal that ruptured uterus and obstructed labor account for a substantial fraction of both direct and indirect maternal mortality. Perinatal outcomes are even

more concerning, with mortality rates reported between 74% and over 90% in various institutional studies. These poor outcomes are linked to delayed referrals, inappropriate use of uterotonic agents, unsupervised home deliveries and insufficient antenatal surveillance [2,5].

The escalating rate of cesarean sections, especially in peripheral and private healthcare settings, has introduced new risk dynamics. Inappropriate surgical techniques, nonstandard uterine incisions and lack of adequate postoperative counseling may compromise uterine scar integrity, increasing the likelihood of rupture in subsequent pregnancies. Additionally, trial of labor after cesarean (TOLAC), when conducted without strict monitoring, contributes to the risk of uterine rupture [1,6].

Despite the critical clinical and public health implications of uterine rupture, there remains a paucity of locally generated comparative data distinguishing outcomes between scarred and unscarred uteri. Such understanding is essential to guide preventive strategies, optimize intrapartum management and improve maternal-fetal outcomes. Consequently, this study aims to compare the incidence, etiological factors, clinical features, surgical management and maternal and fetal outcomes of uterine rupture in scarred versus unscarred uteri in a tertiary care hospital setting.

MATERIALS & METHODS

This cross-sectional descriptive study was conducted in the Department of Obstetrics and Gynaecology, Rajshahi Medical College Hospital, Rajshahi, Bangladesh. The study period extended from 3 March 2012 to 2 September 2012. A total of 42 patients with clinically and surgically confirmed uterine rupture constituted the study population.

Sample Selection

Inclusion criteria

- All cases of uterine rupture (scarred or unscarred uterus)
- Patients admitted directly or referred from peripheral centers
- Rupture confirmed intraoperatively

Exclusion criteria

- Patients unwilling to provide informed consent

Data Collection Procedure

A structured data collection sheet was used to record demographic, obstetric, clinical, operative and outcome-related variables. Upon admission, a detailed obstetric history was obtained, including parity, previous caesarean section, antenatal care status and events preceding rupture. Clinical assessment focused on maternal vital signs, abdominal examination, vaginal bleeding, fetal heart sound auscultation and signs of shock.

Baseline laboratory investigations included blood grouping and Rh typing, hemoglobin estimation, random blood sugar and serum creatinine. Ultrasonography was performed where feasible to assess fetal status and intra-abdominal fluid, although definitive diagnosis was confirmed during laparotomy.

All patients underwent emergency laparotomy under general or spinal anesthesia. Intraoperative findings such as site and extent of rupture, associated injuries and fetal outcome were documented. Surgical management was individualized based on hemodynamic stability, extent of uterine damage, parity and future fertility desire. Postoperative monitoring emphasized early detection of complications and maternal and fetal outcomes were recorded until discharge or death. Data accuracy and consistency were ensured through cross-verification with operative notes and hospital records.

Ethical Considerations

Written informed consent was obtained from patients or legal guardians after appropriate counseling. Ethical approval was granted by the Ethical Review Committee of BCPS and Rajshahi Medical College Hospital. Confidentiality of patient information was strictly maintained.

Statistical Analysis

Data were entered and analyzed using SPSS for Windows. Descriptive statistics were used to summarize frequencies and percentages. Chi-square tests were applied where appropriate to explore associations. Statistical significance was considered at $p \leq 0.05$, consistent with the analytical approach of the thesis.

RESULTS

During the study period, a total of 4,368 deliveries were conducted at Rajshahi Medical College Hospital, of which 42 cases of uterine rupture required laparotomy. Among these, 32 cases occurred in a previously scarred uterus and 10 cases in an unscarred uterus.

Table 1: Baseline Characteristics of patients (n = 42)

Variable	Category	Number of patients (n)	Percentage (%)
Age group (years)	21–25	22	52.4
	26–30	15	35.7
	31–35	3	7.1
	36–40	2	4.8
	Mean ± SD	26.21 ± 2.2	
Gestational age (Weeks)	28–32	1	2.4
	33–36	10	23.8
	37–40	31	73.8
Parity	0	2	4.8
	1	18	42.9
	2–4	22	52.4
Antenatal care status	Unbooked	26	61.9
	Booked (regular)	5	11.9
	Booked (irregular)	11	26.2
Socioeconomic status	Poor	35	83.3
	Middle class	7	16.7
	Rich	0	0.0

Table 1 shows that the patient ranges from 21-40 years with a mean of 26.21± 2.2. The most common age group was 21-25 years (52.4%). Term delivery was recorded in 73.8% of the patients. Patients with parity 2-4 (52.4%) and parity 1 (42.9%) were included. Regarding antenatal checkups, 61.9% were unbooked, 11.9% were booked for regular checkups and 26.2% were booked for irregular checkups. Of the patients, 83.3% were from poor socioeconomic conditions.

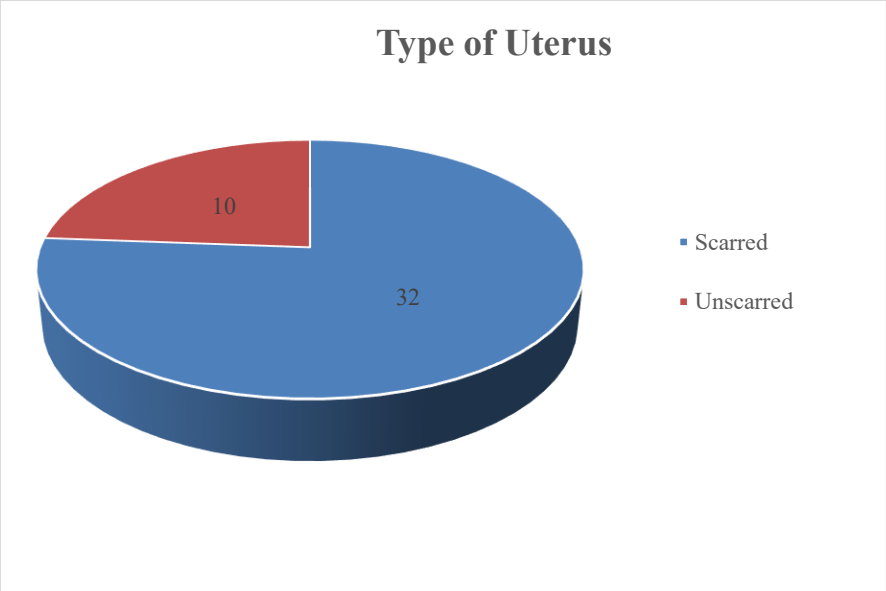

Figure 1: Distribution of Patients Based on Type of Rupture (n=42)

Among the 4368 cases, 42 deliveries were found to have a ruptured uterus during the study period. A scarred uterus was observed in 32 cases and an unscarred uterus in 10 cases.

Table 2: Etiological Factors of Ruptured Uterus

Etiological factors	Number of Patients (n)	Percentage (%)
Previous caesarean section	30	71.4
Obstructed labour	7	16.7
Injurious use of oxytocics	5	11.9

The table shows that 71.4% previous cesarean scar rupture and 16.7% due to obstructed lobour.

Table 3: Clinical Presentation of the patients

Clinical presentation	Number of Patients (n)	Percentage (%)
Abdominal pain	36	85.7
Per vaginal bleeding	16	38.1
Palpable fetal parts	26	61.9
Shock	18	42.9
Absent fetal heart sound	34	81.0
Haematuria	10	23.8

This table shows that 36 (85.7%) of the 42 patients had abdominal pain and 34 (81.0%) of the patients had an absence of fetal heart sounds. Many patients had more than one problem.

Table 4: Anatomical Site of Rupture and Surgical Management

Variable	Category	Number of Patients (n)	Percentage (%)
Site of rupture	Lower segment (scarred)	30	71.4
	Lower segment (unscarred)	10	23.8
	Upper segment	2	4.8
Extension of rupture	Lateral extension	10	23.8
	Cervix/vagina	2	4.8
	Urinary bladder	2	4.8
Surgical procedure	Repair of rupture	26	61.9
	Repair + tubal ligation	12	28.6
	Subtotal hysterectomy	10	23.8
	Bladder repair	2	4.8

This table shows that the most common site was the lower segment (scarred uterus, 71.4%; unscarred uterus, 23.8%; lateral side extension, 23.8 %). By surgical procedure, 61.9% of scar ruptures were repaired.

Table 5: Maternal and Fetal Outcomes Following Uterine Rupture

Outcome	Category	Number of Patients (n)	Percentage (%)
Postoperative complications	Wound infection	9	21.4
	Shock	6	14.3
	Paralytic ileus	2	4.8
Maternal outcome	Recovered	39	92.9
	Maternal death	3	7.1
Cause of maternal death	Haemorrhagic shock	2	4.8
	Septicemia	1	2.4
Fetal outcome	Intrapartum death	34	81.0
	Birth asphyxia	8	19.0
	Death within 7 days	2	4.8
	Total perinatal mortality	**36**	**85.7**

Table 5 shows that regarding postoperative complications, 14.3% of patients experienced shock due to hypovolemia and received two or more units of blood transfusion. 4.8% maternal death due to haemorrhagic shock. Among the 81% of babies born dead, 19% were asphyxiated; among them, 2 (4.8%) cases had died within 7 days after birth. The total perinatal mortality rate was 85.7%.

DISCUSSION

The present study demonstrates that uterine rupture remains a significant obstetric emergency with severe maternal and fetal consequences, while also reflecting a clear transition in etiological patterns toward rupture in a previously scarred uterus. The observed predominance of scarred uterine rupture aligns with global trends associated with rising caesarean section rates, particularly in low- and middle-income countries.

The overall incidence of uterine rupture in this study is consistent with reports from comparable tertiary care and referral settings. Motomura *et al.,* analyzed data from the WHO Multicountry Survey and reported that uterine rupture is disproportionately concentrated among women with a prior caesarean section, particularly in resource-limited settings where intrapartum surveillance is suboptimal [1]. Similarly, Ronel *et al.,* observed an increasing contribution of scar rupture to the overall burden of uterine rupture, paralleling the expansion of caesarean delivery worldwide [4]. These findings reinforce the interpretation that the current incidence

reflects both health system capacity and changing obstetric practices rather than random occurrence.

The demographic profile of affected women in the present study—predominantly younger, multiparous women with parity between two and four—differs from older literature that emphasized advanced maternal age and grand multiparity. Chang reported a similar shift in age and parity distribution over 11 years, attributing this change to the vulnerability introduced by previous uterine surgery rather than cumulative obstetric trauma [3]. Mukasa *et al.,* also noted that prior caesarean section supersedes high parity as a dominant risk factor in contemporary series [2]. This shift underscores the evolving risk landscape of uterine rupture.

Socioeconomic disadvantage and poor antenatal care coverage were prominent in the present cohort. Ahmed *et al.,* demonstrated that lack of antenatal follow-up significantly increases the likelihood of adverse maternal and fetal outcomes following uterine rupture, primarily due to delayed recognition of risk and late presentation [5]. These findings are consistent with those of Tesema *et al.,* who identified limited access to skilled obstetric care and delayed referral as critical determinants of uterine rupture in public hospitals [7]. The clustering of rupture among unbooked women highlights persistent inequities in maternal healthcare access.

Clinically, abdominal pain, shock, absent fetal heart sounds and palpable fetal parts were common presenting features. Phelan emphasized that such classical manifestations often indicate advanced rupture, particularly when diagnosis is delayed, thereby compounding fetal compromise [6]. Ofir *et al.,* further reported that fetal demise is frequently established before hospital admission, especially in settings where intrapartum monitoring is inadequate [8]. These observations help explain the persistently high perinatal mortality observed in the present study.

Anatomically, rupture predominantly involved the lower uterine segment at the site of a previous caesarean scar. This finding is consistent with large observational studies demonstrating that most scar ruptures occur along the lower segment incision line [9]. Zhou *et al.,* confirmed that scar integrity is influenced by interpregnancy interval, incision type and surgical technique, all of which may vary substantially across healthcare systems [10]. The relatively low frequency of upper-segment rupture in the present study supports the predominance of scar-related pathology rather than obstructed labor alone.

Surgical management favored uterine repair over hysterectomy in the majority of cases, reflecting both earlier presentation and localized damage. Sinha et al. reported similar trends in Indian tertiary hospitals, where conservative surgery was increasingly feasible in scar rupture cases detected promptly [11]. In contrast, settings dominated by obstructed labor often report higher hysterectomy rates due to extensive tissue necrosis and infection. The shift toward uterine preservation has important implications for future fertility and psychosocial outcomes.

Maternal mortality in the present study, although still substantial, was lower than figures reported in earlier African and Asian series. Astatikie *et al.,* demonstrated that maternal survival improves significantly with timely surgical intervention and adequate blood transfusion services [12]. Gülmezoglu *et al.,* similarly emphasized that system-level interventions—such as emergency obstetric care availability and skilled surgical teams—are critical to reducing maternal deaths from uterine rupture [13].

Despite improvements in maternal survival, perinatal outcomes remained poor, with an extremely high rate of perinatal mortality. Gibbins *et al.,* reported that fetal outcomes are particularly unfavorable in rupture of the unscarred uterus, but even scar rupture carries substantial fetal risk when diagnosis is delayed [14]. Desta *et al.,* in a systematic review, confirmed that prolonged decision-to-delivery intervals and delayed laparotomy are strongly associated with fetal death [15]. These findings underscore that improvements in maternal outcomes alone are insufficient unless accompanied by rapid intrapartum diagnosis and intervention.

In summary, the present study reflects the global epidemiological transition of uterine rupture toward scar-related etiology, while also highlighting persistent challenges related to socioeconomic inequities, delayed presentation and fetal salvage. Strengthening antenatal surveillance, rationalizing caesarean section practices and ensuring timely emergency obstetric care remain central to improving outcomes.

CONCLUSION

Uterine rupture remains a major contributor to maternal and perinatal morbidity and mortality. The present study demonstrates a clear shift toward scarred uterus rupture as the predominant etiology. While maternal outcomes have improved due to earlier intervention and conservative surgery, perinatal mortality remains alarmingly high. Rational use of caesarean section, improved antenatal surveillance and timely referral are essential to reduce this preventable obstetric catastrophe.

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Conflicts of Interest: There are no conflicts of interest.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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