

# Uterine rupture: a five-year experience at a tertiary care centre in Jeddah, Saudi Arabia

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## Summary

**Objective:** To determine the incidence, characteristics of patients and identified the risk factors, and maternal and fetal outcomes of uterine rupture at KAUH. **Materials and Methods:** Retrospective analysis of 51 cases of uterine ruptures (KAUH), from January 2011 to December 2015. Variables (age, gravidity, height, BMI, risk factors, previous C/S, previous abortion antepartum hemorrhage (APH), postpartum hemorrhage (PPH), gestational diabetes mellitus (GDM), smoking, multiple pregnancies, educational level >12 years, induction and method, mode of delivery, gender, fetal weight, neonatal NICU, and death and maternal outcomes. Ethical approval obtained. Inclusion criteria were all women admitted due to labor that had a ruptured uterus and managed at KAUH. **Results:** In a total of 20,568 deliveries, uterine rupture occurred in 51 cases (incidence of 0.03%, 1:403), scarred vs. unscarred was 1:514, and 1:1870, respectively. Age was 21 to 46 years, with a mean of  $32.69 \pm 5.59$  years. There were two primigravida (3.9%), 27 multigravida (52.9%), and 22 grand multigravida (43.3%). Thirty-nine (76.5%) underwent emergency C/S, three (5.9%) delivered by spontaneous vaginal delivery, and 24 patients (47.1%) had received maximum eight units of packed red blood cells. One patient underwent a hysterectomy, and five women were admitted to the ICU. Hospital stay was from three to nine days. Nine babies had Apgar score  $\leq 6$  at one minute, admission to NICU included nine (17.6%) babies. Neonatal death occurred in five (6.1%) babies. **Conclusion:** Incidence uterine rupture is low 0.03 % in the present institution. Scarred uterus ruptured more frequently than unscarred. Risk factors include age > 35 years, gravidity > 4, past history of C/S, level of education less than 12 years, and significant neonatal morbidity.

**Key words:** Uterine rupture; Hemorrhage; Maternal morbidity; Saudi Arabia.

## Introduction

One of the major and catastrophic complications of normal delivery is a uterine rupture, which is life threatening to mother and the fetus. Uterine rupture refers to the disruption of all uterine layers. There is frequently an increased maternal and neonatal mortality and morbidity [1].

Previous caesarean delivery is a risk factor, and the incidence varies between 0.3 to one percent higher rates of uterine rupture found in women who undergo a trial of labor after previous caesarean delivery. (0.78%) and only 0.22% of patients undergo elective repeat caesarean delivery [2].

The unscarred pregnant uterus is unlikely to rupture it is a very rare event, estimated to occur in (0.0057%) 1/5700 to (0.0020%) 1/20,000 pregnancies. In one series, there were 25 uterine ruptures in women with unscarred uteruses and these events accounted for 13% of ruptures in this study [3].

Predisposing factors for uterine rupture include neglected labor, malpresentation, grand multiparity, breech extraction, and instrumental deliveries [3, 4].

The aim of this study was to determine the incidence, characteristics of patients and identified the predisposing risk factors, and maternal and fetal outcomes of patients

with ruptured uterus at King Abdulaziz University Hospital.

## Materials and Methods

This was a retrospective analysis of all cases of uterine rupture managed at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia from January 2011 to December 2015. The total number of deliveries per year, number, and rate of uterine rupture were retrieved.

Charts of all patients diagnosed with uterine rupture (n=51) reviewed. Variables collected and analyzed were: age in years, gravidity, height in cm, weight in kg, and BMI. Risk factors included previous C/S, previous abortion, antepartum hemorrhage (APH), postpartum hemorrhage (PPH), gestational diabetes mellitus (GDM), smoking, multiple pregnancies, educational level >12 years, induction and method (oxytocin or misoprostol), and no induction, mode of delivery (vaginal or elective C/S or emergency C/S and ventouse), gender (male & female), fetal weight, NICU, neonatal death, and maternal outcome.

Ethical approval was obtained from King Abdulaziz University IRB and the methods were carried out in "accordance" with the approved guidelines. Inclusion criteria were all woman admitted to the labor and delivery facility that had a ruptured uterus and managed at KAUH.

The Statistical Package for the Social Sciences (SPSS), version 20.0 was used to analyze data using chi-square test. The frequency of occurrence of different variables was determined to

Table 1. — Total number of delivery per year, number of cases of rupture (scarred &amp; unscarred). (1:N) is one rupture in a number of deliveries.

Year	Total	Rupture	%	1:N1	Scarred	%	1:N2	Un- scarred	%	1:N3
2011	4760	6	0.13	793	4	0.084	1190	2	0.042	2380
2012	4599	3	0.13	1533	1	0.022	4599	2	0.043	2299
2013	4373	5	0.14	874	2	0.046	2186	3	0.068	1458
2014	3283	11	0.18	298	10	0.304	328	1	0.030	3283
2015	3553	26	0.17	136	23	0.647	154	3	0.084	1184
Total	20568	51	0.03	403	40	0.194	514	11	0.053	1870

% = percentage. 1:N1 = one in the total number of scarred and unscarred uterus.

1:N2 = one in the number of Scarred uterus.

1:N3 = one in the number of unscarred uterus.

Table 2. — Characteristics of patients with rupture.

Variable	Minimum	Maximum	Mean	St. Dev.
Age (years)	21	46	32.69	5.59
Gravidity (N)	1	9	4.35	2.08
Height (cm)	147	173	158.4	6.81
Weight (kg)	109	39	72.96	16.24
BMI (kg/m <sup>2</sup> )	17.1	44.5	29.06	6.37
Duration (hours)	0	15	6.86	4.36

St. Dev. = standard deviation. Duration in hours = duration of labor in hours.

be statistically significant with a *p*-value less than 0.05.

## Results

The total number of deliveries at KAUH from January 2011 to December 2015 was 20,568. The total number of cases of uterine rupture retrieved were 51, with an incidence of 0.03% of and calculated as one rupture per 403 deliveries (1:403). The scarred uterus ruptured more frequently than unscarred (1:514 vs. 1:1870), respectively (Table 1).

Fifty-one patients diagnosed with uterine rupture were analyzed; the youngest was 21 years and the eldest 46 years old with a mean of  $32.69 \pm 5.59$  years. Height, weight, BMI, and duration of labor are shown in Table 2. Their gravidity ranged from one to nine; only two patients were primigravida (3.9%), 27 were multigravida (52.9%), and 22 were grand multigravida (43.3%) (Table 3).

All patients were diagnosed in hospital either antenatally or intraoperatively and in cases delivered vaginally, were diagnosed after delivery

Management and Maternal Outcome: In the management of the present cases, only three (5.9%) patients delivered by spontaneous vaginal delivery, nine had elective C/S (17.6%), and 39 (76.5%) underwent emergency C/S. Twenty-seven patients (52.9%) did not receive any blood transfusion and 24 patients (47.1%) received a maximum eight units of packed red blood cells (PRBCS) (mean 1.10 with Std. Dev. 1.640).

Table 3. — The frequency of gravidity in cases of uterine rupture.

Gravidity	Frequency	Percentage
Primigravida	2	3.9
Multigravida	27	52.8
Grand multigravida	22	43.3
Total	51	100

Table 4. — The mean of the variable studied.

Variable	Minimum	Maximum	Mean	Std. Dev.
Gestational age	30	42	38.12	2.81
Fetal weight (kg)	950	4410	2865	722
Apgar score at 1 min.	0	9	5.90	3.170
Apgar score at 5 min.	0	11	7.65	3.218
Number blood units	0	8	1.10	1.64
Hospital stay days	3	9	4.06	1.53

Only one patient underwent a hysterectomy and it was due to atony and uncontrollable severe uterine bleeding. Maternal morbidity was considered if a patient was admitted to the ICU as a result of severe bleeding, hypovolemic shock, massive blood transfusion, and its complications. A total of five women were admitted to the ICU. Hospitals stay ranges from three to nine days (Table 4).

There were 33 boys (68.6%) and 16 girls (31.4%) born from these women. Fetal weight minimum was 950 grams, and the maximum was 4,410 grams with a mean of 2,864 (SD  $\pm$  722) grams. Nine babies had an Apgar score  $\leq$  6 at one minute. However, at five minutes, 11 babies continued to have a low Apgar score of 6 or less. Admissions to the NICU included nine (17.6%) babies. Neonatal death occurred in five (6.1%) babies. Two babies died of severe prematurity and three of neonatal asphyxia.

Comparing the unscarred and scarred uterus, the risk factors were found to be age more than 35 years with OR 0.122, 95% CI (0.014 - 1.047), and *p*-value  $< 0.028$  (Table 5). Gravidity  $> 4$  had OR 0.222, 95% CI (0.043 - 1.160), and *p*-value  $< 0.059$ . Positive past surgical history had OR 0.091, 95% CI (0.036 - 0.231), and *p*-value  $< 0.059$ . Finally the level of education, if it is less than 12 years, had OR 5.538, 95% CI (1.257 - 24.396), and *p*-value  $< 0.02$  (Table 5). When assessing Apgar score at one minute  $< 6$ , it was more frequently seen in scarred uterus cases vs. unscarred ones, and was statistically significant, OR 0.245, 95% CI: 0.245 ((0.060 - 0.995), and *p*-value  $< 0.047$  (Table 6).

## Discussion

The incidence of uterine rupture varied among institutions depending on the level risk of patients presented to the healthcare center and the level of care. One of the major risk factors is previous caesarean delivery, and the inci-

Table 5. — Comparison of different variables in unscarred and unscarred rupture uterus.

Variable	Unscarred	Scarred	Total	Odd ratio (95% CI)	p
Age (years)					
> 35	1	18	19	0.122 (0.014-1.047)	0.028
< 35	10	22	32		
Gravidity					
> 4	2	20	22	0.222 (0.043-1.160)	0.059
< 4	9	20	29		
Abortion					
Yes	2	17	19	0.301 (0.057-1.574)	0.129
No	9	23	32		
Past surgical					
Yes	4	40	44	0.091 (0.036-0.231)	0.001
No	7	0	7		
APH					
Yes	3	4	7	3.375 (0.036-0.231)	0.162
No	8	36	44		
PPH					
Yes	5	12	17	1.944 (0.496-7.621)	0.269
No	6	28	34		
GDM					
Yes	2	6	8	1.259 (0.216-7.326)	0.559
No	9	34	43		
Induction					
Yes	11	34	45	0.756 (0.640-0.892)	0.213
No	0	6	6		
Oxytocin					
Yes	8	29	37	1.011 (0.226-4.522)	0.653
No	3	11	1		
Labor					
> 8 hrs	6	19	25	1.026 (0.241-4.369)	0.634
< 8 hrs	4	13	17		
Education					
< 12 years	8	13	21	5.538 (1.257 - 24.396)	0.020
> 12 years	3	27	30		
Smoking					
Yes	4	14	18	1.061 (0.264 - 4.259)	0.599
No	7	26	33		
Instrumental					
Yes	1	2	3	1.900 (0.156-23.135)	0.526
No	10	38	48		
Multiple					
Yes	2	2	4	4.222 (0.522-34.147)	0.119
No	9	38	47		
Blood transfusion					
Yes	6	5	11	1.467 (0.384-5.603)	0.412
No	18	22	40		
Total	11	40	51		

dence varies between 0.3% to 1 % [1]. In the present institution, the incidence of total uterine rupture was calculated to be 0.03% (1:403). Although in Saudi Arabia in a different hospital, in 2000 Rouzi *et al.* estimated the incidence of rupture to be 0.01% (1:1011) [5].

In Kenya in 1991 (the Kenyatta National Hospital), in a five-year period, the incidence of uterine rupture was 0.04%

Table 6. — Comparison of different variable in unscarred and unscarred rupture uterus.

Variable	Unscarred	Scarred	Total	Odd ratio (95% CI)	p
Gestational age (weeks)					
> 38	6	29	35	0.455 (0.115 - 1.800)	0.218
< 38	5	11	16		
Fetal weight (grams)					
> 3500	1	9	10	0.344 (0.039 - 3.064)	0.302
< 3500	10	31	41		
Gender					
Male	9	26	35	2.423 (0.459 - 12.798)	0.248
Female	2	14	16		
Apgar score at one minute					
< 6	4	28	32	0.245 (0.060 - 0.995)	0.047
> 6	7	12	19		
Apgar score at five minutes					
< 6	3	8	11	1.500 (0.323 - 6.973)	0.440
> 6	8	32	40		
NICU					
Yes	1	8	9	0.400 (0.044 - 3.598)	0.368
No	10	32	42		
Neonatal death					
Yes	1	8	9	0.400 (0.044 - 3.598)	0.368
No	10	32	42		
Total	11	40	51		

(1:425) [6]. In Sudan in 2001 (Medani Teaching Hospital), the rate reported was 0.41% (1:246) [7]. In Yemen in 2005, in a five-year study of uterine rupture, the incidence was 1.1% (1:92) [8]. In Turkey in 2005, with eight years' experience, there were 20 cases of ruptured uterus, with an incidence of 0.40% (1:250) [9].

The rate of unscarred uterine rupture is different from developed and developing country: 0.012% (1:8434) and 0.11% (1:920), respectively. In the present study, it was 0.053% (1:1870) [10]. A study from the United States indicated the reported rupture of the unscarred uterus to be 0.0045% (1:22000) [2, 11]. In Saudi Arabia in 2000, the rate was found in one institution to be 0.099% (1:1011) [4].

Higher incidence of uterine rupture found in women who underwent a trial of labor after previous cesarean delivery (0.78%) Moreover, only 0.22% of patients undergo elective repeat cesarean delivery [12]. In addition to previous C/S, risk factors include induction of labor, maternal age, parity, height, BMI, education, birth weight, cigarette smoking, gestational age, instrumental vaginal delivery, and inter-pregnancy interval [13]. Previous C/S is the strongest predictor for uterine rupture in which women who are allowing normal vaginal delivery after a previous C/S are 50 times more susceptible to rupture than those who are attempting a second vaginal delivery [14]. Other studies have mentioned further risk factors related to the fetus such as dystocia resulting in protracted labor, macrosomia, and abnormal placentation (e.g. placenta accreta, increta or percreta) [15, 16].

## Conclusion

Incidence uterine rupture is low (0.03%) in the present institution. Scarred uterus ruptures more frequently than unscarred uterus. Risk factors include age > 35 years, gravidity > 4, past history of C/S, level of education less than 12 years, and significant neonatal morbidity.

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