

# A comparative analysis of uterine rupture in 2 decades

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## ABSTRACT

**Objectives:** To compare the changing trends of uterine rupture in 2 decades along with the maternal and fetal outcome in scarred and unscarred uterus.

**Methods:** The risk factors of the uterine ruptures, which occurred in the Ministry of Health Hospitals in Bahrain in 2 decades, were analyzed. The maternal and the fetal outcome was compared between the 2 decades (1981-2000) and between the scarred and unscarred uterus.

**Results:** The rise of uterine rupture in the 2nd decade (50) as compared with the first decade (25) was parallel to the increasing rate of cesarean section (CS). Instrumental deliveries and augmentation of labor were the main significant risk factors in the first decade while induction of labor was in the later decade. There was a significant

decrease of maternal morbidity in the 2nd decade inspite of the increasing rate of uterine rupture. There was no maternal death; however, there were 11 perinatal deaths in the first group compared to 14 in the 2nd group. The maternal morbidity and perinatal mortality was significantly higher in the uterine ruptures of the intact uterus as compared to those with scarred uterus.

**Conclusion:** Inspite of the high incidence rate of the uterine rupture in the later decade, the morbidity of the mother and the fetus show no increase. The increase in the incidence of the uterine rupture is connected to the increasing rate of CS. The rupture of the intact uterus is more catastrophic as compared to the scarred uterus.

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Rupture of the uterus is one of the more serious obstetric complications. It is associated with high rates of maternal and fetal morbidity and mortality. In developing countries, the incidence and consequences of the uterine rupture reflects the standard of the obstetric care. In the last decade, the most common predisposing factors of uterine rupture were grand multiparity, prolonged labor, internal podalic version, breech extraction, and instrumental delivery.<sup>1</sup> To avoid difficult instrumental deliveries, cesarean section (CS) became the most common performed surgical procedure in the modern age. The change in practice is due to improvement in the surgical and anesthetic technique along with the use of electronic fetal monitoring.<sup>2</sup> The frequency of uterine rupture is increasing due to the liberal use of CS.<sup>2</sup> Although, it is stated that the labor after CS

delivery is reasonably safe; however, there is definite risk to the fetus and to the mother.<sup>3</sup> The first objective of this study was to compare the changing trends in the uterine rupture in 2 decades along with the maternal and the fetal outcome. The 2nd objective was to analyze the maternal and fetal outcome of the scarred and unscarred uterus.

**Methods.** The study has been conducted in the Ministry of Health Hospitals, (Salmaniya Medical Complex, Jidhaf's Maternity Hospital and Muharraq Maternity Hospital) in Bahrain. Most of the births was took place as the Ministry of Health Hospitals. Between January 1981 to December 2000 there were 198,237 deliveries. The maternity records and annual statistics in 20 years were reviewed to identify the

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cases of uterine rupture. The cases were divided into 2 groups. Group I was consist of uterine ruptured cases from 1st January 1981 to 31st December 1990 and Group II from 1st January 1991 to 31st December 2000. The records of these patients were reviewed to determine and compare the incidence and the risk factors of the uterine rupture in 2 decades. The total number of deliveries and the total number of CS were calculated in 20 years. Demographic variables such as age, parity, and gestational age were analyzed and compared during this period. The etiological factors studied were the previous CS scar, previous cesarean for cephalopelvic disproportion (CPD) previous evacuation of the uterus, induction of the labor, malpresentation, instrumental delivery, and birth weight of the fetus. The maternal and fetal outcome was studied to compare the 2 decades along with comparison between scarred uterus and unscarred uterus.

The data was analyzed using Statistical Package of Social Sciences (SPSS). The odds ratio, confidence interval and p value were calculated. A p value of  $<0.05$  was considered to be statistically significant.

**Results.** A total of 75 cases of uterine ruptures were identified and analyzed retrospectively. There were 25 cases in the year 1981 to 1990 (Group I) and 50 cases in 1991 to 2000 (Group II). It was noticed that there was a significant increase in the incidence of uterine raptures in the 2nd decade (25-50). There was a parallel increase in the incidence of CS rate from 5755 in the first decade to 10,031 in the 2nd decade (**Table 1**). There was no significant difference in 2 groups regarding patient's age, parity and gestational age (**Table 2**). Analyzing and comparing the risk factors amongst the 2 decades (**Table 3**), it was found that induction of labor was a very significant risk factor in Group II, while in Group I, augmentation of labor and instrumental deliveries were the main significant risk factors. However, the other risk factors like previous CS, CPD, evacuation of the uterus, malpresentation and macrosomia were not statistically different comparing both groups. It was seen that inspite of the increasing uterine rupture (25-50) in the 2nd decade, the severity of shock, the need for hysterectomy and the broad ligament hematoma was high in the first decade (**Table 4**). In Group I, the mean number of units of blood transfusion (BT) was 4.9 (SD 6.0) and 1.8 (SD 2.2) in Group II and this was statistically significant. The need of BT was high when there was a need for hysterectomy. The other morbidities such as bladder injury, cervical and vaginal laceration, pulmonary complication, and wound infections were not found to be different comparing both groups. There were 11 perinatal deaths in Group I as compared to 14 in Group II, odd ratio was 2.0, and it did not reach at any significant level. Twenty-eight uterine ruptures

occurred in women with intact uterus and 47 with scarred uterus (**Table 5**). As the incidence of complete uterine rupture was extremely significant in women with unscarred uterus, the need for hysterectomy as well as BT due to hypovolemic shock was significant in this group comparing to women with scarred uterus. The perinatal mortality was more significant in uterine rupture of unscarred uterus ( $p=0.006$  and odds ratio=4.3).

**Discussion.** The incidence of uterine rupture in 20 years was one in 2643 deliveries. The incidence in the first decade was one in 3,900 deliveries and in the 2nd decade was one in 2015. The reported incidence of the uterine rupture in the literature has varied from one in 200 deliveries to one in 800, even one in 3,000 obstetric delivery.<sup>2,4,5</sup> The increase of the rupture of the uterus from 25 in the first decade to 50 in the 2nd decade was very significant and this could be explained by the liberal use of CS. As the incidence of the uterine rupture did not decrease with the improvement in the health services but rather doubled in the later decade, our major concern was to identify the risk factors. The overall incidence of CS in 20 years was 7.6%; it was 5.9% in the first decade and 9.95 % in the 2nd decade. It remains a great diversity in the incidence rate of CS rates all over the world. There has been stabilization of CS rates from 12.8-23.6% in various countries.<sup>6</sup> Lao and Leung<sup>7</sup> found that women with scarred uterus had a 30 times higher incidence of the uterine rupture compared to those with unscarred uterus. Many authors had suggested that cesarean scar is the most common predisposing factor of the uterine rupture.<sup>2,8-11</sup> Induction of labor was found to be a very significant risk factor in the 2nd decade when comparing with first decade where augmentation of labor and instrumental deliveries were more significant risk factors. The most common contributory factor to the rupture of the intact uterus was injudicious use of uterine stimulant.<sup>12</sup> Lunan<sup>13</sup> from Glasgow emphasized that the induction of labor should be avoided if possible and if oxytocics are to be used, great caution is required.<sup>13-15</sup> Instrumental deliveries were found to be the significant risk factors in the first decade (7) compared to the 2nd decade (one). This can be explained by the fact that the current practice discourages the use of difficult midforceps. These observations have been made by Eden et al.<sup>2</sup> Macrosomia was not found to be a significant risk factor in this study. Today fetal macrosomia and malpresentation are detected by ultrasound and difficult labor has been replaced by CS.<sup>2,3</sup> The uterine rupture was found to be associated with high maternal mortality in the past and it continues to be an important cause of maternal deaths in developing countries. Uterine rupture was responsible in 5-20% of maternal deaths in developing countries.<sup>4,16-18</sup> Appleton et al<sup>19</sup> and Miller et al<sup>1</sup> reported that there

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**Table 1** - Comparison of uterine rupture and CS in 2 decades.

Variable	Group I	Group II	P value	OR	95% CI
n of uterine rupture	25	50	0.0085	1.9	1.2 - 3.1
n of CS	5,755	10,031	<0.0001	0.6	0.55 - 0.59
Total n of deliveries of Group I = 97,507 and Group II = 100,730. n - number, CS - cesarean section, OR - odds ratio, CI - confidence interval					

**Table 2** - Statistical difference between demographic variable among women with uterine rupture in 2 decades using t-test.

Variable	Group I mean (SD)	Group II mean (SD)	Significance
Age (years)	32 (5)	30 (7)	0.2
Parity	3.6 (1.9)	3 (2.2)	0.4
Gestational age (weeks)	37.8 (4.2)	38.5 (3.2)	0.6
SD - standard deviation			

**Table 3** - Statistical analysis of risk factors for uterine rupture in 2 decades.

Risk factors	Group I n=25	Group II n=50	P value	OR	95% CI
Previous CS	12	35	0.08	2.5	0.9 - 6.8
Previous CS for CPD	4	13	0.39	0.5	0.15 - 1.9
Previous evacuation of the uterus	9	11	0.27	2	0.7 - 5.7
Induction of labor	1	19	0.002	0.07	0.008 - 0.54
Augmentation of labor	11	9	0.03	3.6	1.2 - 10.4
Malpresentation	8	9	0.24	2.1	0.7 - 6.5
Instrumental delivery	7	1	0.005	9.3	1.8 - 49.2
Breech delivery	1	3	1	0.6	0.06 - 6.6
Birth weight >4kg	2	5	1	0.78	1.14 - 4.35
CPD - cephalopelvic disproportion, CS - cesarean section, n - number, OR - odds ratio, CI - confidence interval					

**Table 4** - Comparison of maternal and fetal outcome in 2 decades.

Outcome	Group I n=25	Group II n=50	P value	OR
Complete uterine rupture	17	29	0.46	1.5
Shock	10	3	0.0006	10.4
Admission to ICU	2	2	0.6	2.1
BT	22	31	0.08	4.5
BT >5 units	9	5	0.01	5.1
Hysterectomy	14	9	0.001	5.8
Bladder injury	3	5	1.0	1.2
Cervical and vaginal involvement	8	11	0.4	1.7
Broad ligament hematoma	7	4	0.065	4.5
Pulmonary complications	1	3	1.0	0.7
Wound infection	4	1	1.0	1.7
Perinatal deaths	11	14	0.2	2
BT - blood transfusion, n - number, OR - odds ratio, ICU - intensive care unit				

**Table 5** - Comparison of maternal and fetal outcome amongst women with unscarred and scarred uterus in 2 decades.

Outcome	Unscarred uterus n=28	Scarred uterus n=47	P value	OR	95% CI
Complete uterine rupture	25	21	0.0002	10.3	2.7 - 39
Hysterectomy	13	10	0.037	3.2	1.2 - 8.9
BT	28	25	<0.0001	50.3	2.9 - 872.6
BT >5 units	11	3	0.0013	9.5	2.3 - 38.3
Shock	9	4	0.013	5.1	1.4 - 18.6
Admission to ICU	3	1	0.14	5.5	0.5 - 55.9
Visceral injuries	19	9	<0.0001	8.9	3.0 - 26.1
Pulmonary complications	3	1	0.14	5.5	0.5 - 55.9
Wound infection	3	2	0.36	2.7	0.4 - 17.3
Perinatal death	15	10	0.006	4.3	1.5 - 11.8
BT - blood transfusion, n - number, OR - odds ratio, CI - confidence interval, ICU - intensive care unit					

were no maternal deaths attributed to the uterine rupture. Fortunately, in our study we had no deaths for both groups due to this tragedy. Maternal morbidity in the form of peripartum hysterectomy, shock and BT were higher in the first group compared to the 2nd group. This could be attributed to more complete or catastrophic uterine rupture in the fist group compared to the 2nd group where scar dehiscence was more common. Timely diagnosis of the uterine rupture and electronic monitoring of the fetus and uterine activity mostly contributed to the low frequency of maternal morbidity in the 2nd group. Leung et al<sup>20</sup> reported that the BT was required in 30% of the patients who had uterine rupture. In this study peripartum hysterectomy and urological injuries were comparable with other studies.<sup>14,21</sup> In comparing the morbidity of the uterine rupture of the scarred uterus with those of unscarred uterus, it is noticeable that the incidence of complete rupture of the uterus along with shock, the needs for BT and peripartum hysterectomy were more with intact uterus. Suner et al<sup>22</sup> observed that the diagnosis of spontaneous rupture is often missed or delayed that leads to maternal and fetal mortality and morbidity. Urogenital injuries along with perinatal deaths were also more with unscarred uterus. Many authors also agreed with our findings that the rupture of the intact uterus is often complete and more catastrophic requiring hysterectomy in majority while the lower segment uterine scar rupture is often incomplete cured with simple repair.<sup>17,19,23</sup> The uterine rupture is associated with high perinatal mortality and morbidity. Perinatal mortality in this study was found to be 33.3%. Fetal mortality had been reported to vary between 25-86%.<sup>4,7,19</sup> there was no significant increase of fetal morbidity or mortality in the 2nd decade inspite of having double the number of rupture of the uterus.

## References

- Miller DA, Goodwin TM, Gherman RB, Paul RH. Intrapartum rupture of the unscarred uterus. *Obstet Gynecol* 1997; 89: 671-673.
- Eden RD, Parker RT, Gall SA. Rupture of the pregnant uterus: A 53-year Review. *Obstet Gynecol* 1986; 68: 671-674.
- Leung AS, Farmer RM, Leung EK, Medearis AL, Paul RH. Risk factors associated with uterine rupture during trial of labour after cesarean delivery: A case control study. *Am J Obstet Gynecol* 1993; 168: 1358-1363.
- Ola ER, Olamjulo JA. Rupture of the uterus at the Lagos University Teaching Hospital, Lagos, Nigeria. *West Afr J Med* 1998; 17: 188-193.
- Fedorkow DM, Nimrod CA, Taylor PJ. Rupture uterus in pregnancy: a Canadian hospital's experience. *Can Med Assoc J* 1987; 137: 27-29.
- Chua S, Arulkumaran S. Trial of scar. *Aust N Z J Obstet Gynecol* 1997; 37: 1-6.
- Lao TT, Leung BFH. Rupture of the gravid uterus. *Eur J Obstet Gynecol Reprod Biol* 1987; 25: 175-180.
- Clark SL. Rupture of the Scarred Uterus. *Obstet Gynecol Clin North Am* 1988; 15: 736-744.
- Garnet JD. Uterine rupture during pregnancy: an analysis of 133 cases. *Obstet Gynecol* 1964; 23: 898-905.
- Alsakka M, Hamsho A, Khan L. Rupture of the pregnant uterus - a 21 years review. *Int J Gynaecol Obstet* 1998; 63:105-108.
- Chin MMS, Harvey JA, Duffy BL. Uterine Rupture during labour in Primigravida. *Aust N Z J Obstet Gynecol* 1996; 36: 210-212.
- Gordon H. Uterine rupture and its association with oxytocin drugs: the Northwick Park Hospital Experience. *J Obstet Gynecol* 1988; 8: 135-148.
- Lunan CB. Vaginal delivery after caesarean section in sub-Saharan Africa. *Br J Obstet Gynaecol* 1997; 104: 1335-1338.
- Chen KC, Hsieh TT. Rupture of gravid uterus: a eight-year clinical analysis and review of the literature. *Chang Keng I Hsueh Tsa Chih* 1992; 15: 15-22.
- Sweeten M, Graves WK, Athanassiu A. Spontaneous rupture of the unscarred uterus. *Am J Obstet Gynecol* 1995; 172: 1851-1856.
- Rahman J, Al-Sibai MH, Rahman MS. Rupture of the uterus in labour - A review of 96 cases. *Acta Obstet Gynecol Scand* 1985; 64: 311- 315.
- Golan A, Sandbank O, Rubin A. Rupture of the Pregnant uterus. *Obstet Gynecol* 1980; 56: 549-554.
- Elkady AA, Bayomy HM, Bekhiet MT, Nagib HS, Wabha AK. A review of 126 cases of ruptured gravid uterus. *Int Surg* 1993; 78: 231-235.
- Appleton B, Targett C, Rasmussen M, Readman E, Sale F, Permeze M. Vaginal birth after caesarean section: an Australian multicentre study. *Aust N Z J Obstet Gynecol* 2000; 40: 87-91.
- Leung AS, Leung EK, Paul RH. Uterine rupture after previous cesarean. Delivery: Maternal and fetal consequences. *Am J Obstet Gynecol* 1993; 169: 945-950.
- Forsnes EV, Browning JE, Gherman RB. Bladder rupture associated with uterine rupture. A report of two cases of occurring during vaginal birth after cesarean. *J Reprod Med* 2000; 45: 240-242.
- Suner S, Jagminas L, Peipert JF, Linakis J. Fatal spontaneous rupture of a gravid uterus: case report and literature review of uterine rupture. *J Emerg Med* 1996; 14: 181-185.
- Ahmed SM, Daffalla SE. Incidence of uterine rupture in a Teaching Hospital, Sudan. *Saudi Med J* 2001; 22: 757-761.