

# Rupture of the unscarred uterus in pregnancy – a life-threatening event

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## ABSTRACT

The rupture of an unscarred uterus in pregnancy may result in catastrophic consequences for both mother and baby. This is usually related to a delayed diagnosis and treatment, because of a low index of suspicion. There have been described a series of risk factors incriminated in unscarred uterine rupture, such as abdominal trauma, labor induction, obstructed or neglected labor, and operative vaginal deliveries. Although it is a rare event that happens more often in old multiparous patients, there have been reported cases of uterine rupture in primiparous women. A uterine rupture is an unpredictable event that happens suddenly, can have dramatic, but non-specific symptoms, and requires a high index of suspicion and prompt management to reduce maternal and neonatal morbidity and mortality. The purpose of this study is to synthesize available information about the rupture of the unscarred uterus, its risk factors, diagnosis, and management.

**Keywords:** uterine rupture, unscarred uterus, risk factors, diagnosis, treatment

## INTRODUCTION

For both mother and fetus, uterine rupture is a catastrophic event associated with high morbidity and mortality rates [1]. It happens more often in a previously scarred uterus, usually after a cesarean delivery or a myomectomy, while the rupture of an unscarred uterus, also known as primary uterine rupture, is a far less well-understood concept [2]. Uterine rupture occurs in approximately 1 in 5,700 scarred uterine pregnancies and in approximately 1 in 20,000 intact uterine pregnancies [3,4].

According to available information for industrialized countries, the prevalence of uterine rupture for women who have had a previous cesarean surgery is around 1%, and it is exceedingly rare, about 1 per 10,000 deliveries, for women who have not had a previous cesarean section. Overall, the rate is less than one in a thousand [5].

Uterine rupture is a more common and significant finding in less developed countries. Most of the

rates are between 0.1 and 1% [5]. Poor socioeconomic circumstances, uncontrolled fertility, illiteracy, adolescent marriages, and a pelvis that is underdeveloped and constricted, are all known to increase the risk of uterine rupture [6]. According to reports from Nigeria, Ghana, Ethiopia, and Bangladesh, approximately 75% of uterine rupture cases were associated with an unscarred uterus [7]. Perinatal mortality ranged from 74% to 92%, with maternal death ranging from 1% to 13% [5]. According to a study from the Netherlands, the incidence varies between 0.7 per 10,000 deliveries for an unscarred uterus and 5.1 per 10,000 deliveries for a scarred uterus [8].

Several studies have found increased morbidity and mortality of both mother and fetus in patients without a uterine scar when comparing scarred and unscarred groups [3,9,10]. This is probably because rupture of an unscarred uterus is most frequently a traumatic event, has widely diverse and

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nonspecific symptoms, and requires a high level of diagnostic suspicion [11]. Maternal and neonatal outcomes can be improved by understanding the risk factors, quick recognition of signs and symptoms and immediate surgical intervention [12].

During labor, about 90% of cases of unscarred uterine rupture occur in the anterior lower uterine segment. The rupture of the posterior uterine wall, on the other hand, is an uncommon event [3]. Fetal malposition has been linked to posterior uterine ruptures, particularly occiput-posterior position and malpresentation with a transverse line [13,14].

Some malpresentations can result in uterine hyperdistention, which can lead to abnormal uterine rupture [15].

## METHODS

The purpose of this study is to review the literature and to gather available information about the risk factors, diagnosis, differential diagnosis and management of the uterine rupture of an unscarred uterus. We have used key words such as 'uterine rupture', 'unscarred uterus', 'risk factors for uterine rupture', 'diagnosis of uterine rupture', 'treatment of uterine rupture', and we have searched articles through PubMed, the World Health Organization (WHO), MedScape and UpToDate. We identified over 40 articles describing rupture of the unscarred uteri and its risk factors and we summarised these information we found.

## RISK FACTORS FOR THE RUPTURE OF AN UNSCARRED UTERUS

Rupture of an unscarred uterus is more often associated with traumatic factors, such as abdominal trauma, labor induction, internal podalic version, assisted breech delivery, external cephalic version, operative vaginal delivery [3,12,16], or obstructed labor [1], but it can also occur spontaneously in great multiparous parturients [16,17], in a congenitally malformed uterus that lacks the normal ability to expand [18], in patients with a history of an invasive mole or with abnormal placental implantation [19].

There have been case reports of uterine rupture as a result of car accidents or interpersonal abuse. Even though domestic violence is the leading cause of death among pregnant women, domestic violence screening is a relatively recent concept [11,20]. During a 9-years period, El Kady et al. discovered four incidences of uterine rupture in a community of abusive pregnant women in California, two of which occurred in the absence of labor [20].

Medication for labor induction and augmentation, such as oxytocin and prostaglandins, are well-

known risk factors that have been thoroughly studied in pregnancies after cesarean births. In the absence of a previous cesarean, even low-dose oxytocin augmentation can raise the chance of rupture. Two cases of unscarred uterine rupture were reported by one institution to be linked to doses of 2 to 4 mU of oxytocin per minute given over a very short period of time [11,16]. According to a major Swedish study, inducing labor after a previous vaginal delivery increased the risk of uterine rupture by double, even in uteri that were presumed unscarred [21]. Nonetheless, two studies reported that prostaglandins might be more likely than other induction medications to cause uterine rupture [22,23].

During internal podalic and external cephalic versions, uterine rupture is also a risk. As a consequence, some obstetricians avoid neuraxial anesthesia because they fear a uterine rupture could be missed if the pain associated with the rupture is hidden by the anesthetic. Neuraxial anesthesia has been demonstrated to improve patient comfort and the rate of successful external cephalic version [24,25]. However, whether external cephalic version is an independent risk factor for uterine rupture is still a point of contention. A recent cohort research found no evidence of a link between the two [26]. External cephalic version is not contraindicated in a woman who has had a previous low-transverse uterine incision, according to the American College of Obstetricians and Gynecologists (ACOG) [27].

Obstructed labor is a major cause of maternal morbidity and mortality, especially in developing countries. Absolute fetopelvic disproportion, the fetus's unfavorable orientation (deflexion of the head, occiput-lateral or posterior positions, transverse lie or breech presentation), or a macrosomic baby may cause the obstruction of the labor. Other conditions, such as pelvic tumors, can induce obstruction in rare cases. Scarring from female genital mutilation has also been linked to obstructed labor. Obstructed labor can lead to uterine rupture, which is an important cause of hysterectomy and is associated with high rates of maternal and neonatal mortality [7].

The increased rates of uterine rupture in the low-income countries may be largely due to a higher incidence of grand multiparity [11]. In a multipara with four or more previous deliveries, the risk of uterine rupture is anticipated to increase tenfold [28]. In a 10-year study, only 2 of 15 uterine ruptures happened in unscarred uteri, and both were ruptures at grand multipara (para 4 and para 6) [29].

In addition to the previously mentioned risk factors, high maternal age ( $\geq 35$  years) virtually doubles the risk of uterine rupture when compared to women between 25 and 29 years of age (21). This is

in line with a study that found a 3.2-fold higher risk of uterine rupture among women 30 years and older who had a previous cesarean [30]. More women are at risk for uterine rupture as the birth rate for women over 30 years continues to rise [31], especially when undertaking a trial of labor after a previous cesarean delivery.

The likelihood of placenta accreta should be considered, especially in multiparous patients with a history of cesarean birth and an anterior low-lying placenta or placenta previa. Although a recent study revealed no occurrences of uterine rupture in several patients diagnosed with placenta accreta [32], this condition is usually recognized as a substantial risk for uterine rupture [11].

Given the high prevalence of uterine abnormalities, which is estimated to be one in every 594 pregnancies [33], cautious therapy of affected patients is necessary. There are reports of rupture of a pregnancy in a non-communicating horn, after misoprostol induction in the second trimester [34].

Chronic corticosteroid medication, which has not been previously described, may increase the risk of uterine rupture by affecting collagen synthesis and weakening the uterine wall's connective structure. Finally, prior research has linked placental abruption to hypertonic uterine contractions as a possible cause of uterine rupture [35].

## DIAGNOSIS AND MANAGEMENT

The clinical difficulty of detecting uterine rupture and acting before it causes more morbidity remains significant. According to Walsh et al., over 35 cases of uterine rupture in primigravidae have been recorded in the literature over the last 60 years, with 10 of them occurring since 2000 [4].

In any postnatal collapse, uterine rupture on an unscarred uterus should be suspected. Maternal tachycardia and fetal bradycardia are two of the most common signs of intrapartum uterine rupture [36], followed by abdominal pain, vaginal bleeding [16], loss of uterine contractions, loss of uterine resting tone [11], and hypovolemic shock [4]. Unfortunately, none of these are specific manifestations and are frequent in normal labor.

In primigravid women, abdominal pain, hypovolemia, and fetal compromise can be symptoms of a variety of diseases. This set of symptoms is most usually associated with placental abruption, which might go undetected in the absence of vaginal bleeding [4]. Subcapsular liver hematoma with or without rupture [37], rupture of the broad ligament [38], splenic rupture [39], uterine torsion [40], and uterine vein rupture [41] are some of the less common disorders to consider. All of these conditions will need surgical intervention, and a patient with

these symptoms should undergo a laparotomy as soon as possible [4].

According to common thinking, the best way to identify patients with impending or actual uterine rupture is to continuously monitor contractions and fetal heart rate, including the installation of intrauterine pressure catheters [11]. The clinical usefulness of such surveillance is still being debated.

The ruptured uterus exhibits fewer contractions per hour and fewer episodes of tetany than an intact uterus, according to a case-control study of patients with uterine rupture in labor, patients successfully undergoing vaginal birth following cesarean section, and patients with uncomplicated labor [42]. Matsuo et al. recently proposed the staircase sign, which is characterized by a decrease in the amplitude of contractions prior to fetal bradycardia, as a possible predictor of uterine rupture [43].

In cases of uterine rupture, fetal heart rate tracings are extremely diverse and nonspecific, making detection even more difficult. The only significant heart rate tracing anomaly associated with rupture was fetal bradycardia, according to a new case-controlled study that looked at fetal heart rate variations in cases of uterine rupture after attempted vaginal birth after cesarean section. There was no link between fetal tachycardia, mild to moderate variable decelerations, severe variable decelerations, or late decelerations and rupture [20].

Because non-reassuring fetal heart rate tracings led to cesarean birth, the intrauterine pressure catheter was thought to be of limited clinical utility. Intrauterine pressure catheter was also found to be no more or less useful in identifying uterine rupture in patients who had previously had a cesarean delivery, either [4].

The extent of the uterine damage, the patient's hemodynamic stability, future reproductive desires, and the surgeon's abilities, must all be considered when determining the best surgical care after uterine rupture [11]. According to a 2003 survey of obstetricians in the United Kingdom who had seen at least one case of unscarred uterine rupture, 34% of reported cases required hysterectomy and 56.5% were repairable [44]. Surprisingly, 80% stated that if they were in the same circumstance again, they would attempt repair, while most said that consulting a urologist would be necessary [44].

## DISCUSSIONS

Uterine rupture is a severe obstetric complication associated with a high rate of morbidity and mortality, especially in developing countries [5]. Early detection of uterine rupture and prompt laparotomy are the most important factors determining

neonatal and maternal morbidity and mortality [4]. With easy access to obstetric treatment, including cesarean sections for obstructed labor, uterine rupture of the unscarred uterus should be uncommon [5]. On the other hand, as the use of cesarean sections and induction of labor increases in developed countries, the number of women who are at risk of uterine rupture rises [21]. Although uterine rupture is more common in multiparous women who have had a previous cesarean delivery, it is an obstetric complication that must be evaluated in all women, regardless of parity, in order to ensure proper management and the best possible outcome [4].

In evaluating the long-term hazards associated with primary cesarean surgery, the prevalence of uterine rupture in women who have had a previous cesarean section is critical [5]. The main issue in high-income countries is uterine rupture following a cesarean section, whereas in less and least developed countries, uterine rupture of the unscarred uterus is more common and the consequences are more severe [21]. To solve the challenge, new approaches are required. Reduced primary cesarean section rates and improved care for women who have had a previous cesarean section should be the focus of efforts to prevent uterine rupture associat-

ed morbidity and death [5]. Reduced unwanted pregnancies, particularly for women of high parity, accessibility to obstetric services, including cesarean section for obstructed labor and symphysiotomy, and guidelines to ensure that misoprostol for labor induction is used in safe dosages are all required in developing countries to reduce the prevalence of rupture of unscarred uterus [4,5,45].

## CONCLUSIONS

Uterine rupture can occur at any time and is linked to a high rate of neonatal and maternal morbidity. When compared to rupture of the scarred uterus, rupture of the unscarred uterus happens more frequently in older, multiparous women. Even though uterine rupture in a primigravida is uncommon, it does happen. If the fetus is to be saved and future problems avoided, uterine rupture must be diagnosed early, and exploratory laparotomy performed as soon as possible. As a result, regardless of parity, practitioners must hold a strong index of suspicion for uterine rupture in all women presenting with findings of hypovolemia and fetal distress.

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