

## Case Report

# Uterine rupture in a pregnancy without previous uterine scarring and induction of labor with misoprostol: a case report

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## ABSTRACT

Uterine rupture (UR) is a serious obstetric complications involving the uterine wall injury during pregnancy or delivery. It occurs in one in 5,000 to 7,000 births, with about up to 10% requiring hysterectomy. Risk factors include previous uterine scarring, use of uterotonics, induction of labor, history of uterine trauma, high multiparity, abnormal placentation, fetal abnormalities, advanced maternal age, a high body mass index (BMI), and lack of prenatal monitoring. A 36-year-old Mexican female with five previous pregnancies, all terminated by vaginal route, with poor prenatal monitoring and high blood pressure. Prostaglandin E1 (misoprostol 50 mcg) was used in two doses with the patient starting labor in an active phase, but presented moderate abdominal pain, no fetal heart rate, and weak transvaginal bleeding. A probable detachment of placenta and fetal death was suspected; therefore, it was decided to perform an emergency caesarean section. This case highlights the importance of obstetric care, particularly in relation to gestational hypertension, induction of labor, and severe complications as uterine rupture. In our patient misoprostol was used to prepare the cervix and promote induction of term delivery, but its administration led to uterine rupture. UR is a rare obstetric emergency that requires immediate attention and proper surgical management. It is more common in women with previous uterine scarring and can occur in a uterus without a surgical history. Risk factors and clinical monitoring are crucial for early warning signs. Misoprostol use should be adjusted based on patient characteristics and pre-existing factors. Timely diagnosis and treatment are essential to reduce morbidity and mortality.

**Keywords:** Uterine rupture, Rare obstetric emergency, Labor, Uterine bleeding, Misoprostol, Hysterectomy, Fetal death, Risk factors

## INTRODUCTION

Uterine rupture (UR) is considered one of the most serious complications in obstetrics due to the high risk of morbidity and mortality for both mother and fetus. Defined as the uterine wall injury that occurs during pregnancy or delivery.<sup>1</sup>

UR refers to the total separation of the three layers of the uterus: the endometrium (inner epithelial layer), the myometrium (muscle layer) and the perimetrium (outer serous layer).<sup>2</sup>

Uterine dehiscence is a similar condition, characterized by partial division of the uterus without passing through all its layers. This condition can result in a "uterine window," a thinning area on the uterine wall that could allow the fetus to be visible through the myometrium. Uterine dehiscence is often asymptomatic and may be detected incidentally.<sup>2</sup>

According to the American College of Obstetricians and Gynecologists (ACOG), the risk of uterine rupture in women with a previous cesarean section who attempt labor is between 0.5% and 0.9%. The uterine segment is the most frequent area of rupture, occurring in 58% of cases. This obstetric complication is one of the most serious and constitutes an emergency that endangers the life of the mother and the fetus. Maternal mortality varies between 1% and 13%, while perinatal mortality ranges from 74% to 92%.<sup>3</sup>

Uterine rupture is estimated to occur in one in 5,000 to 7,000 births. For women with a scarless uterus, the rate of uterine rupture is about one rupture per 10,000 to 25,000 births.<sup>3</sup>

About 10% of uterine ruptures require hysterectomy for management, while the rest of cases are managed by repair, without removing the uterus.<sup>4</sup>

The presence of a uterine scar is a crucial factor for the prognosis of subsequent pregnancies in women with a history of cesarean section. However, other surgical procedures performed on the uterus can also cause ruptures in future pregnancies.<sup>3,5</sup>

Uterine rupture is associated with adverse outcomes in more than half of the cases. Negative results included the need for hysterectomies, blood transfusions, bladder or ureter lesions, reoperations, APGAR score <5 at 5 minutes, and perinatal deaths.<sup>6</sup>

Most uterine ruptures occur at the end of pregnancy, with cases occurring in the first or second trimester quite limited. The risk of recurrence after a uterine rupture is considerable, but it should not be an obstacle for patients to try to conceive again.<sup>7,8</sup>

The incidence of uterine rupture is usually lower in developed countries. Risk factors include previous uterine

scarring and use of uterotronics. Other factors related to the risk of uterine rupture include induction of labor, history of uterine trauma, high multiparity, abnormal placentation, fetal abnormalities, advanced maternal age, a body mass index (BMI) high and lack of prenatal monitoring.<sup>9</sup>

Pharmacological agents such as prostaglandins (dinoprostone and misoprostol) are often used to induce vaginal delivery. However, its use involves important safety considerations, such as an increased risk of uterine rupture, tachysystole and overstimulation in pregnant women, which could cause a worrying fetal heart rate and fetal hypoxemia.<sup>10</sup>

UR is a known and potentially fatal complication associated with misoprostol use, although its incidence is quite low. Misoprostol, an E1 prostaglandin analogue originally developed to prevent gastric ulcers, is known for its uterotonic and cervical softening effects, making it a common choice for induction of labor and termination of pregnancy. However, current ACOG guidelines recommend avoiding misoprostol in the third trimester for women with uterine scars.<sup>11</sup>

In this paper, we present the case of a 36-year-old patient with a prolonged pregnancy and no previous cesarean section, who was given an E1 prostaglandin analogue to induce labor. During the process, she suffered a uterine rupture, which required urgent surgical intervention (obstetric hysterectomy) due to massive bleeding. The postsurgical prognosis was positive, with a favorable clinical outcome after appropriate management.

## CASE REPORT

A 36-year-old Mexican female, size 150 cm, weight 71 kg, without chronic diseases, no allergies, with five previous pregnancies, all terminated by vaginal route. The last birth attended 12 years ago and without complications: a weight of approximately 3500 g. No history of complications in previous pregnancies.

The patient was sent from a first-level care hospital to the gynecology and obstetrics department of a second-level care hospital with a 41.1-week pregnancy. She had a prolonged pregnancy, with 41.2 weeks of gestation confirmed by ultrasound in the second trimester, with poor prenatal monitoring (only three antenatal visits during the entire pregnancy), presenting a blood pressure figure of 140/90 mmHg, so hypertensive disease was suspected in pregnancy.

Hospitalization was decided to evaluate a way of interrupting the gestation, monitoring blood pressure and preeclampsia profile.

A non-stress test (NST) was performed to assess fetal well-being, which was "reactive", and a recent ultrasonography report, which reported a pregnancy of 38.5 weeks of gestation, fetal weight of 3589 g, Phelan index of 10.7 cm,

anterior placenta grade III, cephalic fetus and fetal heart rate of 130 beats per minute (bpm).

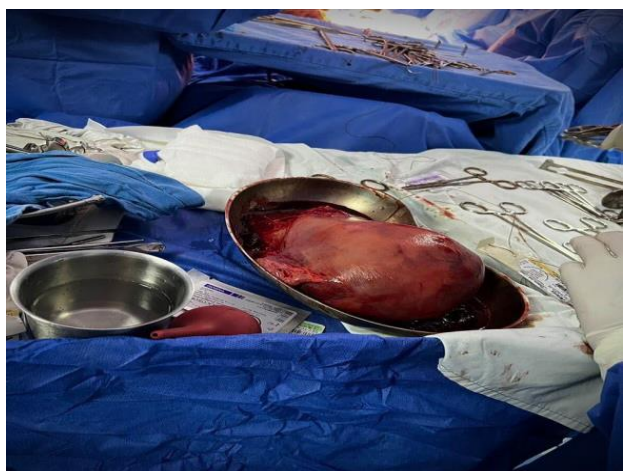


**Figure 1: A non-stress test was performed to assess the fetal well-being of the patient with prolonged pregnancy, which was "reactive".**

The patient had high blood pressure up to 140/92 mmHg, without data on hypertensive encephalopathy, with a preeclamptic profile without alterations, and the diagnosis was classified as gestational hypertension.

It was decided to initiate labor induction for the completion of pregnancy by a score of 3 on the Bishop index, which is unfavorable. Prostaglandin E1 (misoprostol 50 mcg, SL) was used as the first dose; and continuing with unfavorable cervical conditions, with a 1 cm dilation and a long and firm posterior cervix, it was decided to administer a second dose of prostaglandins (misoprostol 50 mcg, SL) five hours later to improve cervical conditions.

Nine hours after the last dose of misoprostol the patient started labor in an active phase with 6 cm cervical dilation and a fetal heart rate of 140 bpm. Subsequently, the patient presented moderate abdominal pain, unable to monitor fetal heart rate, no fetal heartbeat, and a weak transvaginal bleeding, dark red, with a shock index of 1.5 (blood pressure 106/67 mmHg, HR 162 bpm).



**Figure 2: UR in the inferior segment throughout the cervix.**

A probable detachment of placenta and fetal death was suspected; therefore, it was decided to perform an emergency caesarean section by performing an abdominal incision in the middle-supraumbilical line. Upon reaching the abdominal cavity, a 2000 ml hemoperitoneum and a free pregnancy product were observed in the abdominal cavity. The newborn was male, with no signs of life and weighing 3630 g.



**Figure 3: Obstetric hysterectomy was performed for uterine rupture, in which labor induction was induced with synthetic prostaglandins.**

The patient remained hospitalized, hemodynamically stable and with stable vital signs, without data of low cardiac output. The 24-hour control laboratory studies reported: Hb 10.9 g/dl, HTO 31.4%, platelets  $130 \times 10^3/\mu\text{l}$  and leukocytes  $7.4 \times 10^3/\mu\text{l}$ . After 72 hours of postoperative evolution and clinical improvement she was discharged.

## DISCUSSION

This clinical case highlights several relevant aspects of obstetric care, mainly related to hypertension in pregnancy, the induction of labor and severe obstetric complications such as uterine rupture.

Gestational hypertension is one of the most common complications during pregnancy, characterized by elevated blood pressure figures after the 20th week of gestation, with no proteinuria or other signs of preeclampsia.<sup>12</sup>

In this case, the patient presented blood pressure of 140/90 mmHg, which led to a preliminary diagnosis of gestational hypertension. Despite the presence of gestational hypertension, she did not show signs of hypertensive encephalopathy (persistent headache, visual alterations or epigastralgia) or alterations in the preeclamptic profile, despite elevated blood pressure figures, this enabled it to be classified properly. However, the lack of adequate prenatal monitoring, which limited early detection of hypertension, underlines the importance of more rigorous

prenatal follow-up to reduce the risk of serious complications associated with these disorders.<sup>12</sup>

Spontaneous uterine rupture, although rare in women without uterine scars, represents an obstetric emergency that requires early diagnosis and urgent surgical intervention to save the life of the mother and fetus. In this case, it was decided to induce labor, which is a suitable management in a term pregnancy with gestational hypertension, since the continuation of the gestation could have increased the risks for the mother and the fetus.

Induction of labor was performed using 50 µg of misoprostol (E1 prostaglandin) sublingually, and with an unfavorable Bishop index (score 3), suggesting that induction may be more difficult. Although the first doses did not produce a significant change in the cervix, the patient eventually progressed to the active phase of labor. Induction with prostaglandins is indicated in prolonged or complicated pregnancies, however it should be done with caution because of associated risks such as increased uterine tone and the possibility of uterine rupture.<sup>10</sup>

Misoprostol, a synthetic compound similar to prostaglandin E1, has been used extensively in obstetrics as a medicine to prepare the cervix and promote induction of term delivery. This drug, which belongs to the prostaglandin family, binds to smooth muscle cells in the uterus, increasing both the intensity and frequency of contractions. As for the cervix, it facilitates the breakdown of collagen in the connective tissue, which helps to decrease cervical tone.<sup>13</sup>

While misoprostol is a commonly used option for induction of labor, in this case, the administration of the drug led to serious complications, including uterine rupture and the need for a total hysterectomy.

According to scientific evidence, oral misoprostol at low doses (<50 µg) is associated with lower rates of cesarean section compared to other methods such as vaginal dinoprostone and has a lower risk of hyperstimulation affecting fetal heart rate. However, one of the limitations of misoprostol is that it can lengthen the time to delivery, which may explain the reduction in vaginal deliveries within the first 24 hours of induction.<sup>14</sup>

In this case, a dose of 50 µg of misoprostol was used sublingually, which is consistent with the recommended dose for some delivery induction protocols. This dose has been associated with an increased likelihood of achieving a vaginal delivery within the first 24 hours, as indicated by several studies. However, despite the potential benefits, misoprostol is also associated with risks, such as uterine hyperstimulation, which can lead to serious complications like uterine rupture, as occurred in this case.<sup>14</sup>

Uterine rupture is a rare but serious complication that can be triggered by the administration of prostaglandins, especially at high doses or in unfavorable cervical

conditions. Although an optimal dose regimen of misoprostol that is completely safe has not been established, evidence suggests that lower doses (25 µg) may offer a favorable balance between efficacy and safety, with less likelihood of serious adverse effects. In this case, the patient had an unfavorable Bishop's index with a score of 3, which may have increased the risk of over-response to medication and complications such as uterine rupture.<sup>14,15</sup>

In this context, the administration of 50 µg misoprostol may have induced excessive uterine contraction in a uterus with unfavorable conditions, culminating in uterine rupture, a complication that resulted in severe bleeding and intrauterine fetal delivery. Uterine rupture is one of the most serious complications of induction of labor and is associated primarily with the use of drugs that induce intense uterine contractility, such as prostaglandins.<sup>14,15</sup>

It is essential that physicians consider both the benefits and risks when deciding on misoprostol treatment, especially in patients with pre-existing conditions such as gestational hypertension, and those with an unfavorable cervix. Constant monitoring during induction is crucial to prevent serious complications. Although misoprostol has been shown to be effective, its use should be carefully evaluated and adjusted according to the individual clinical characteristics of each patient.<sup>15</sup>

UR is a rare but serious complication during labor, requiring urgent surgical intervention due to high risks for the mother and fetus. In this clinical case, the patient experienced uterine rupture during misoprostol-induced delivery, leading to significant hemoperitoneum and the need for an emergency C-section. Early diagnosis of this complication is crucial, since late treatment can substantially increase both maternal and fetal morbidity and mortality.<sup>1,3,16</sup>

The first consistent sign of uterine rupture is the presence of prolonged and severe fetal bradycardia, a finding that indicates acute fetal distress. In this case, the patient presented an episode of moderate abdominal pain, transvaginal bleeding and inability to auscultate fetal heart rate, which led to suspicion of fetal involvement. The absence of fetal heart rate, together with the alteration in the mother's vital signs, such as an increase in heart rate (162 bpm), was indicative of a serious complication. In most cases of uterine rupture (66.6%), altered fetal well-being patterns are the most frequent sign, underlining the importance of continuous monitoring during labor.<sup>16</sup>

The diagnosis of uterine rupture, however, can be complicated because its symptoms and signs are nonspecific. In this case, the transvaginal bleeding was another sign of the possible rupture, although it does not always appear. The absence of palpation of fetal presentation also suggested a possible displacement of the fetus within the abdominal cavity, a common finding in complete uterine ruptures. These signs, combined with

clinical suspicion and rapid surgical intervention, confirmed the diagnosis of uterine rupture.<sup>16</sup>

It is essential to emphasize that vaginal deliveries after a previous cesarean section should be performed under strict supervision in hospital units that have the capacity to perform an urgent cesarean section and provide advanced neonatal support. This case demonstrates the importance of continuous monitoring of the mother and fetus, especially when medications are used to induce labor in high-risk conditions such as gestational hypertension and an unfavorable Bishop index.

Clinical suspicion was confirmed by the visualization of hemoperitoneum and uterine rupture during emergency cesarean section, which led to a total hysterectomy. UR is associated with a high risk of fetal death, as occurred in this case and requires immediate surgical intervention to preserve the mother's life.<sup>3,6</sup>

The hysterectomy performed on this patient was necessary due to severe uterine rupture and irreparable damage to the uterus. In uterine ruptures without previous scarring, as in this case, there is an increased risk of complications such as massive bleeding and shock symptoms. Women with these types of ruptures have a higher incidence of vaginal bleeding and a greater need for hysterectomy, especially when the damage to the uterus is irreversible or the bleeding cannot be controlled.<sup>17</sup>

Although urgent hysterectomies are associated with severe morbidity (26.5-31.5%) and a maternal mortality rate of 4.8%, in this case the early intervention helped to stabilize the patient. The decision to perform a hysterectomy was key to avoiding further blood loss and additional complications, given the extensive uterine rupture and lack of viability to repair it. This type of intervention becomes indispensable when the bleeding is uncontrollable and endangers the patient's life.<sup>17</sup>

Early intervention in uterine rupture can save lives. The emergency cesarean section and subsequent hysterectomy were necessary to control bleeding and avoid further complications.

On the other hand, the patient suffered a massive hemorrhage of 3000 ml, a serious and frequent complication in UR cases. Despite the significant amount of blood lost, the patient did not present clinical data on shock, which highlights the effectiveness of early and adequate hemodynamic management. Fluid and transfusion administration, which included four globular packets and two frozen fresh plasmas, was essential to stabilize his hemodynamic status. A massive bleeding protocol consisting of 1:1 or 2:1:1 ratio of red blood cells, plasma and platelets may be used if rapid laboratory results are not available.<sup>18</sup>

Early management of the hemorrhage, together with constant monitoring of clinical parameters, allowed the

patient to stabilize in time, avoiding major complications that could have resulted in hypovolemic shock.<sup>18</sup>

The patient's prognosis was favorable despite severe complications during delivery, including massive bleeding and the need for emergency surgery. In addition, the 24-hour post-surgery control studies showed satisfactory results, such as hemoglobin levels of 10.9 g/dl and a hematocrit of 31.4%, indicating adequate hematological recovery. At 72 hours, the patient presented signs of clinical improvement, allowing her hospital discharge. Proper resuscitation, together with timely and effective surgical management, played an essential role in its early stabilization and recovery, which allowed a favorable prognosis in such a critical clinical context.<sup>18</sup>

## CONCLUSION

Uterine rupture, although rare, is an obstetric emergency that requires immediate attention and proper surgical management to save the mother's life and avoid further complications. Although it is more common in women with previous uterine scarring, it can also occur in a uterus without a surgical history, with serious consequences for both the mother and fetus. It is crucial to identify the risk factors of each patient and perform comprehensive clinical monitoring of maternal and fetal well-being during labor to detect early warning signs.

The use of misoprostol in the induction of labor, although beneficial, should be carefully evaluated and adjusted according to the clinical characteristics of each patient. Safe doses below 50 µg should be balanced against associated risks, especially uterine rupture, as this drug induces intense uterine contractility. Pre-existing factors such as multiparity, gestational hypertension and advanced maternal age increase the risk, so constant monitoring of maternal and fetal well-being is essential to prevent complications and ensure safe management.

Since UR is not a frequent pathology, especially in patients without clear risk factors, timely diagnosis and treatment are essential to reduce morbidity and mortality, as evidenced in the management of this patient.

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