

## Analysis of 20 Cases of Uterine Rupture during Pregnancy

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### ABSTRACT

**Objective:** To explore the incidence, the risk factors, early signs, treatment and preventive measures of uterine rupture during pregnancy.

**Methods:** Patients with uterine rupture were retrospectively collected in the Fourth Hospital of Hebei Medical University, Cangzhou Central Hospital and Huantai Maternal and Child Health Hospital of Zibo City in Shandong province in China from January 2012 to December 2018. Maternal age, gestational week, times of pregnancy, parity, surgical history, the symptoms and signs of uterine rupture as well as management and perinatal outcomes were analyzed.

**Results:** The incidence of uterine rupture was 4.6/10 000 (20/43841). Seventeen cases had a history of cesarean section, one had a history of laparoscopic myomectomy, one had a history of hysteroscopic surgery and 1 case has no history of uterine surgery. Abdominal pain and abnormal fetal heart rate are common clinical manifestations. Among the 20 patients with uterine rupture, thirteen (65%) occurred in the third trimester, including 4 cases of vaginal birth after cesarean, one case induced by oxytocin, and the other 8 cases of spontaneous uterine rupture. Six cases (30%) of uterine rupture in mid-pregnancy were induced abortion by rivanol or drug abortion by mifepristone plus misoprostol. Seventeen cases were complete uterine rupture and 3 cases were incomplete uterine rupture, all were confirmed by surgery. One patient underwent subtotal hysterectomy for secondary infection and the rest underwent uterine repair. In the third trimester, there were 13 cases and 4 cases of stillbirth (two cases had no fetal heart at first diagnosis, two cases had bradycardia before operation and the APGAR score of emergency cesarean delivery was 0). Severe neonatal asphyxia occurred in 1 case and mild asphyxia in 3 cases, all were transferred to neonatal intensive care unit (NICU) for further treatment. The 1-minute APGAR score of the other 5 neonates was 9/10.

**Conclusion:** Scarred uterus is the most common cause of uterine rupture. Reducing the rate of cesarean section is an effective measure to prevent uterine rupture. Abdominal pain and abnormal fetal heart rate are common clinical manifestations. Maternal and child outcomes can be improved if uterine rupture can be early diagnosed and surgery performed in time.

**Keywords:** Uterine rupture, Pregnancy, VBAC, Caesarean section

### INTRODUCTION

Uterine rupture defined as the tearing of the uterine wall during pregnancy or delivery is one of the rare but serious acute abdomens in obstetrics, leading to hysterectomy of mother, fetal distress and even fetal death in uterus, if the diagnosis and treatment is delayed.

The clinical data of 20 patients with uterine rupture during pregnancy were retrospectively analyzed to explore the incidence of uterine rupture, related factors, early clinical signs, maternal and infant outcomes and diagnosis and management, so as to achieve early identification and

treatment of uterine rupture and improve maternal and infant outcomes.

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**MATERIALS AND METHODS**

**Patients**

Patients with uterine rupture were collected in the Fourth Hospital of Hebei Medical University, Cangzhou Central Hospital and Huantai Maternal and Child Health Hospital of Zibo City in Shandong Province in China from January 2012 to December 2018. There were 20 cases totally, all case were confirmed by surgery.

**Diagnosis**

Complete uterine rupture refers to the rupture of the whole layer of the uterine muscle wall, and the uterine cavity is connected with the abdomen. Incomplete rupture of uterus refers to the rupture of part or whole uterine muscle layer, but the serosa layer is intact, the uterine cavity is not connected with the abdomen and the fetus and its appendages remain in the uterine cavity.

**Methods**

Dates of each patient were recorded and analyzed retrospectively, including maternal age, gestational week,

times of pregnancy, parity, history of past operation, symptoms and signs of uterine rupture as well as the management and perinatal outcomes.

**RESULTS**

1. The incidence of uterine rupture: a total of 20 cases of uterine rupture were collected, and the number of hospital delivery in the same period was 43841, the incidence of uterine rupture was 4.6/10,000. The incidences of uterine rupture in the three different levels of medical institutions were 5.1/10 000, 8.0/10 000 and 1.6/10 000, respectively.
2. Date collection: among the 20 cases of uterine rupture, the patient aged from 24 to 39 years old, and the gestational weeks were from 12 to 42+2 weeks. Seventeen cases had a history of cesarean section, one case had a history of laparoscopic myomectomy, one had a history of hysteroscopic surgery and 1 case has no history of uterine surgery. Twenty patients were coded as case 1 to case 20 (**Table 1**).

**Table 1.** Patient demographics (n=20).

Case	Age	Gestational age (Week)	Ravidity	Parity	History (Time)	Interval (Year)	Inducement
1	29	12	3	2	CS (1)	3	NO
2	28	36	2	1	CS (1)	1	NO
3	34	38	4	3	CS (1)	2	NO
4	32	20	3	2	CS (1)	2	NO
5	32	18	3	1	CS (1)	3	Rivanol
6	34	32	3	2	CS (2)	6	NO
7	39	37	11	2	CS (2)	3	NO
8	35	33	5	1	CS (1)	6	NO
9	24	39	4	1	CS (1)	5	VBAC
10	29	16	4	2	CS (1)	1	NO
11	37	17	5	2	CS (1)	2	NO
12	29	39	2	1	CS (1)	4	Spontaneous abortion
13	38	39	2	1	LM	3	TOLAC
14	37	42	3	1	NO	5	Oxytocin-induced labor
15	27	29	2	1	CS (1)	4	VBAC
16	28	16	3	2	CS (1)	4	Mifepristone+Misoprostol
17	30	34	2	0	HS (1)	3	NO
18	37	39	4	1	CS (1)	9	NO
19	32	40	3	1	CS (1)	7	NO
20	30	18	2	1	CS (1)	7	Mifepristone+Misoprostol

CS: Cesarean Section; LM: Laparoscopic Myomectomy; HS: Hysteroscopic Surgery; VBAC: Vaginal Birth after Cesarean; TOLAC: Trial of Labor after Cesarean Section

**Symptoms and signs at the moment of diagnosis**

Common clinical manifestations were abdominal pain, abnormal fetal heart and vaginal bleeding. Type of

abdominal pain: ten patients presented with persistent, severe abdominal pain. One patient presented with irregular lower abdominal pain, which was misdiagnosed as threatened preterm labor in the hospital where she first

visited. One patient presented with excessive uterine contractions, and both of the two patients eventually suffered from fetal bradycardia (Table 2).

**Table 2.** Symptoms and signs at the moment of diagnosis.

Presence of symptom	Case n (%)
Abdominal pain	12 (60)
Abnormal fetal heart rate	7 (35)
Vaginal bleeding	5 (25)
Hypotension/shock	3 (15)
No sign	3 (15)

**Time and inducement of uterine rupture**

Among the 20 patients with uterine rupture, thirteen (65%) occurred in the third trimester, including 4 cases of vaginal birth after cesarean, one case induced by oxytocin, and the other 8 cases of spontaneous uterine rupture. Six cases (30%) of uterine rupture in mid-pregnancy were induced abortion by rivanol or drug abortion by mifepristone plus misoprostol (Table 3).

**Table 3.** Time of uterine rupture.

Time of uterine rupture	Case n (%)
<14 weeks	1 (5)
14-28 weeks	6 (30)
>28 weeks	13 (65)

**Perinatal outcomes**

Among the 20 patients, seventeen cases were complete uterine rupture and three cases were incomplete uterine rupture, all were confirmed by surgery. One patient underwent subtotal hysterectomy for secondary infection and the rest underwent uterine repair. Postpartum hemorrhage occurred in nine patients (45%) (Estimated blood loss>1000 ml). There were 13 cases of uterine rupture in the third trimester and 4 cases suffered from stillbirth (two cases had no fetal heart at first diagnosis, two cases had bradycardia before operation and the APGAR score of emergency cesarean delivery was 0). Severe neonatal asphyxia occurred in one patient and mild asphyxia in three patients, all were transferred to neonatal intensive care unit (NICU) for further treatment. The 1-minute APGAR scores of the other five neonates were 9/10.

**DISCUSSION**

Uterine rupture is an obstetric emergency associated with severe maternal and perinatal morbidity and mortality. The incidence of uterine rupture varies from country to country and increases with rates of intended vaginal delivery after caesarean. In 2018, the Nordic obstetric surveillance study

reported a set of data [1]. The incidence of uterine rupture was 7.8/10 000 in Finland and 4.6/10 000 in Denmark. In this study, the three medical institutions were of different levels, and the incidence of uterine rupture in grass-roots county-level hospitals was lower than that in provincial hospitals (1.6/10000 vs. 5/10000). It was believed that provincial hospitals received more referrals from other hospitals, and the proportion of high-risk pregnancy was high. More importantly, it was related to the vaginal delivery after cesarean section.

Risk factors for uterine rupture during pregnancy or delivery have been reported in the literature, including advanced age, macrosomia, expired pregnancy, short delivery interval, number of cesarean section operations, single-layer suture of uterine incision, vaginal trial of pregnancy after cesarean section and pregnancy after laparoscopic hysteromyoma removal or hysteroscopic surgery. For those who had no previous history of uterine surgery, uterine rupture was considered to be related to the weakness of myometrium caused by uterine congenital development or trauma, multiple births and the use of uterine contraction-promoting drugs. In recent years, with the development of gynecological endoscopy technology, the number of pregnant women who underwent laparoscopic myomectomy and hysteroscopy surgery is increasing and the incidence of uterine rupture is also increasing. With the increase of gestational weeks, the intrauterine pressure gradually increases, and the myofibrillar rupture is the direct cause of uterine rupture. Therefore, uterine rupture is prone to occur in late pregnancy. The incidence of uterine rupture after laparoscopic myomectomy was 0.3%-1% [2,3]. In this study, one patient had a history of laparoscopic myomectomy. At 39 weeks of gestation, severe abdominal pain and fetal bradycardia occurred. A stillborn baby was born during the operation. A longitudinal rupture of the anterior wall of the uterus about 12 cm. long was found that passed through the bottom to the posterior wall of the uterus. One patient had undergone transcervical resection of septum in a local county hospital. Abdominal pain occurred at 34 weeks of gestation. The pain was mild at the beginning. In the initial hospital it was misdiagnosed as threatened preterm birth. Abdominal pain aggravated 3 days later. The pain was mainly around the umbilical cord and upper abdomen, accompanied by nausea and vomiting. The patient was transferred to our hospital as “acute pancreatitis”. After admission, severe abdominal pain, shock symptoms and fetal bradycardia (60 times/min) developed. Emergency surgery was performed. Uterine rupture was found during the operation. The rupture was located at the bottom of the uterus, about 3 cm in size and the muscle layer near the rupture was thin (Figure 1). APGAR score was 0 after fetal delivery, but it did not recover after 40 min of rescue. Two patients underwent uterine repair, the mother recovered smoothly. Due to the atypical symptoms, she missed the best opportunity for surgery and fetal distress even intrauterine

stillbirth occurred, leading to medical disputes. In this study, six cases of uterine rupture in mid-pregnancy were related to abortion by rivanol or mifepristone combined with misoprostol in scarred uterus. Some patients even had irregular labor induction, uterine rupture was not detected in time and a week later, they were transferred to a tertiary hospital where serious uterine cavity infection and pelvic infection had occurred, so hysterectomy had to be performed.



**Figure 1.** Case 17 of uterine rupture.

The clinical manifestations of uterine rupture are diversified. Typical uterine rupture is easy to diagnose according to its history, symptoms and signs. Fetal distress is considered to be the most common clinical manifestation. Other common clinical manifestations include severe abdominal pain, abnormal vaginal bleeding, hematuria, tachycardia, hypotension and shock in pregnant women. B ultrasound is the preferred diagnostic method. Once ultrasound prompted peritoneal effusion, uterine rupture should be considered combined with clinical manifestations. In this study, twelve patients (60%) had abdominal pain: 10 patients showed persistent and severe abdominal pain. One patient presented with irregular lower abdominal pain, misdiagnosed as threatened premature delivery in the hospital where she first visited. One patient presented with abnormal uterine contraction (excessive uterine contractions), and two patients eventually developed fetal bradycardia. A literature from Taiwan in 2016 reported that severe abdominal pain accompanied by fetal movement may be an early sign of uterine rupture [4]. Abnormal fetal heart monitoring is the most direct method to diagnose fetal distress. Some scholars believe that the late deceleration or variable deceleration may be the first symptom of uterine rupture. In this study, intrauterine stillbirth occurred in 7 patients with abnormal fetal heart and 2 had no fetal heart at first diagnosis. Four cases presented with fetal bradycardia, one with bradycardia accompanied by frequent delayed deceleration. Two neonatal were transferred to NICU due to severe neonatal asphyxia, and three patients suffered from stillbirth during operation.

## CONCLUSION

Once uterine rupture is diagnosed, the operation should be carried out as soon as possible. It is the key to save fetal life and maternal uterus to open the green channel and race against time. For high-risk women without fertility requirements, contraceptive measures should be taken to avoid unnecessary induced labor, reduce uterine cavity operation and the incidence of uterine rupture. Clinicians should grasp strictly the indications of gynecological myomectomy and hysteroscopy, handle the relationship between hysteroscopy and pregnancy, ensure the suture under laparoscopy, and improve hysteroscopy technology. At the same time, we need to make our best to reduce the rate of cesarean section and reduce the incidence of uterine rupture.

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