

Uterine rupture in patients with a history of laparoscopy or hysteroscopy procedures

Three case reports

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Abstract

Rationale: Uterine rupture is a rare incidence but can lead to catastrophic maternal and fetal consequences. We still need to place a high premium on these cases.

Patient concerns: The patients all showed hemodynamic shock with complaints of serious pain in the abdomen. They all had a history of laparoscopy or hysteroscopy procedures.

Diagnoses: Case 1 and 2 were diagnosed during surgery. Case 3 was diagnosed by an urgent abdominal ultrasonogram before surgery.

Interventions: We performed emergency surgeries for the 3 cases.

Outcomes: Three patients all recovered well. But only the child in case 2 survived.

Lessons: It must be emphasized that pregnant women with a history of such surgeries should be aware of uterine rupture during pregnancy.

Abbreviations: IVF = in vitro fertilization, MD = myotonic dystrophy, N = neutrophil, NICU = neonatal Intensive Care Unit, PAS = placenta accreta spectrum, TTTS = twin–twin transfusion syndrome, UR = uterine rupture, WBC = white blood cell.

Keywords: hemodynamic shock, hysteroscopy, laparoscopy, placenta percreta, uterine rupture

1. Introduction

Rupture of the pregnant uterus is an uncommon but severe obstetric event that poses a significant risk of hemorrhage. When the loss of blood is significant, the mother may present with hemodynamic collapse. It is also known that the rate of uterine rupture (UR) increases in patients with a history of uterine surgery. In comparison with transabdominal surgery on the

uterus, laparoscopy and hysteroscopy are associated with less postoperative pain, a short hospital stay, and faster recovery time. However, our obstetricians keep in mind that laparoscopic surgeries, such as myomectomy or salpingectomy, entail risk factors for UR. At the same time, hysteroscopic surgeries, such as myomectomy and septum resection, are also known risk factors for UR in pregnancy.^[1]

Placenta percreta is the most invasive form of placenta accreta spectrum (PAS) disorders, where the villous tissue is found to invade the full thickness of the uterine wall through the serosa.^[2] Spontaneous uterine rupture due to placenta percreta principally occurs during the third trimester, as the risk of UR due to placenta percreta in the second trimester is very low.^[3]

We have not found any report in the literature regarding UR due to placenta percreta in the second trimester in which the patient had a history of laparoscopic salpingectomy or previous resection of the interstitial portion at laparoscopy. We also have not found any report of UR after hysteroscopic surgery for endometrial polyps in the third trimester.

2. Case report

2.1. Case 1

A 26-year-old woman, gravida 2, para 0, at 23 weeks of gestation, was brought to the emergency department complaining of acute right abdominal pain for 5 hours without emesis. She had a history of laparoscopic salpingectomy due to an isthmus pregnancy nearly 8 months before. Upon physical examination, her temperature was 37°C, blood pressure was 116/62 mmHg, and pulse rate was 110 bpm. Abdominal muscle tension and tenderness were primarily located in the right middle and lower

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Synopsis: Women with a history of laparoscopy or hysteroscopy should be aware of placenta percreta and uterine rupture during pregnancy.

Patient has provided informed consent for publication of the case.

Informed written consent was obtained from the patient for publication of this report and accompanying images.

The authors have no conflicts of interest to disclose.

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Figure 1. Corresponding intraoperative images of the defect at the right cornua of the uterus due to placenta percreta with active bleeding.

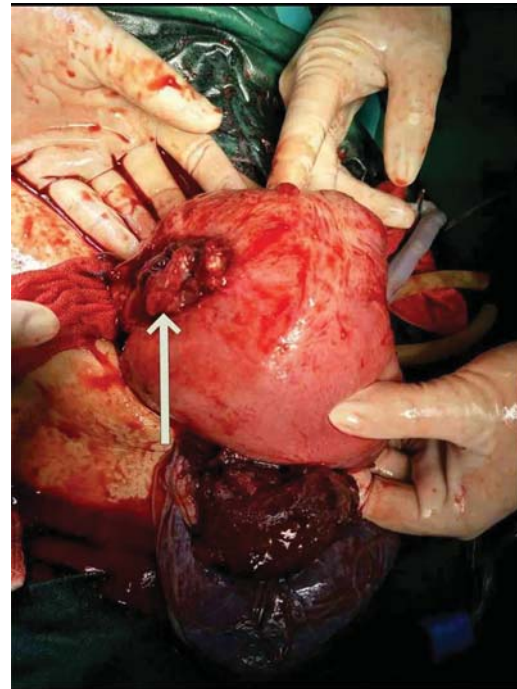


Figure 2. Corresponding intraoperative images of the defect at the right cornua of the uterus due to placenta percreta with active bleeding.

portions of the abdomen. Blood tests showed a WBC count of $10.05 \times 10^9/L$ with a neutrophil (N) fraction of 84.74%, and a hemoglobin of 80 g/dL. Abdominal ultrasonography showed a heterogeneous hypoechoic region located near the area of the appendicitis, with a range of about $1.4 \text{ cm} \times 3.4 \text{ cm}$. Simultaneously, we could see a free-liquid, anechoic area as deep as 40 mm in the pelvic cavity. Obstetric ultrasonography showed a normal fetal heart rate of 138 beats/min. The patient was taken to the general surgery department with a diagnosis of acute appendicitis, and although antibiotics were prescribed, the pain was not relieved. Two days later, a blood test showed a WBC count of $12.3 \times 10^9/L$, N of 87.74%, and hemoglobin of 60 g/dL. Blood pressure was 88/52 mmHg and pulse rate was 110 bpm. When emergency surgery was performed, the surgeons found about 1000 mL of intraperitoneal hemorrhagic fluid, but the appendix was normal. We were asked to participate in the surgery, and we found a rupture at the right cornua of the uterus that we perceived to be placenta percreta with active bleeding (Figs. 1 and 2). We decided to remove the fetus from the lower uterine segment, and then made a double-layered suture at 2 locations (the rupture site and the lower uterine segment). The patient recovered well and was discharged 7 days after surgery.

2.2. Case 2

The patient was a 28-year-old woman, gravida 2, para 0, at 26 + 5 weeks of gestation, who was referred with sudden diffuse abdominal pain that was sustained for 1 day. She had a history of previous resection of the left interstitial portion at laparoscopy 4 months prior to this gestation. She was told that she could try to become pregnant 3 months after the surgery. Upon physical examination, her temperature was 36°C, blood pressure was 90/54 mmHg, and pulse rate was 121 bpm. Abdominal muscle tension and tenderness were located in the entire abdominal area.

Blood tests showed a WBC of $13.05 \times 10^9/L$, N of 82%, and hemoglobin of 68 g/dL. Abdominal ultrasonography showed a marked collection of intraperitoneal fluid. Obstetric ultrasonography showed a normal fetal heart rate of 153 beats/min. We then performed abdominocentesis on the patient, and extracted 5 mL of unclotted blood from her abdomen. We decided to perform an emergency cesarean section, and found approximately 1200 mL of intraperitoneal hemorrhagic fluid. A 2-cm tear was observed at the left cornua of the uterus, and we observed placenta percreta with active bleeding (Figs. 3 and 4); we then performed a double-layered suture. A male infant was delivered (Apgar scores, 2–6–8; immediate, 1 minute, and 5 minutes, respectively; weight, 1050 g) and the patient had an uneventful recovery. The baby was transferred to the Neonatal Intensive Care Unit (NICU) and discharged from the hospital after 2 months; and the child currently presents with no health issues.

2.3. Case 3

A 35-year-old primigravida presented at 29 + 5 weeks of gestation with complaints of serious pain in her abdomen with a duration of 4 hours and mild vaginal bleeding of 2 hours. She also had complained of decreased fetal movements of nearly 3 hours. At the time of presentation, her pulse was 125 beats per minute and blood pressure was 88/59 mmHg. Tenderness was noted in her abdomen and an urgent abdominal ultrasonogram revealed an empty uterus. A singleton dead fetus with complete amniotic sac outside the uterine cavity was observed (Fig. 5). The pregnancy had been obtained by in vitro fertilization due to endometriosis. The patient showed a history of uterine surgery for endometrial polyps using hysteroscopy, and extirpation of an abdominal bilateral ovarian chocolate cyst 5 years before the current pregnancy. Approximately 1600 mL of blood was drained at emergency exploratory laparotomy. There was a defect of 10 cm

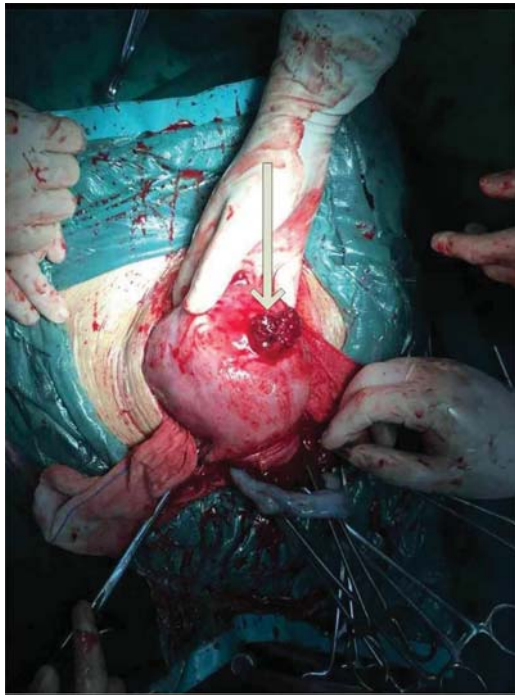


Figure 3. A 2-cm tear was observed at the left cornua of the uterus, and we observed placenta percreta with active bleeding.

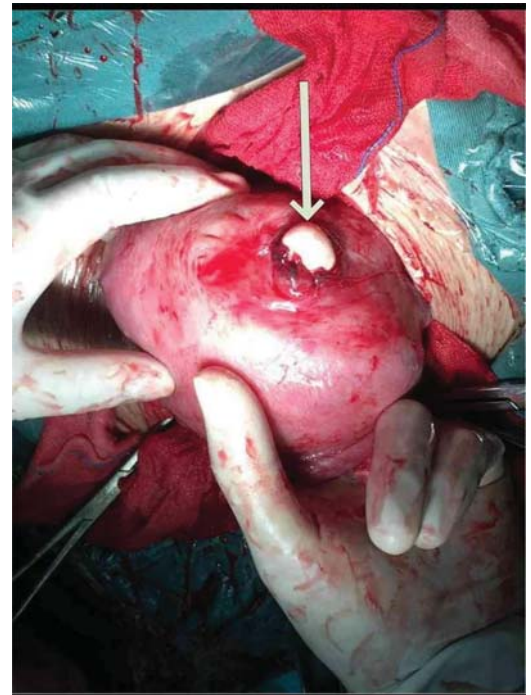


Figure 4. A 2-cm tear was observed at the left cornua of the uterus, and we observed placenta percreta with active bleeding.

at the bottom of the uterus, which was repaired in 3 layers. Complete herniation of membranes with amniotic fluid and a dead fetus inside it was observed near the empty uterus (Fig. 6). The patient was RH-negative, but there was no source of RH-negative blood available at the time. In total, 700 mL of blood was given to the patient by an autotransfusion device. The patient was discharged after 7 days.

3. Discussion

3.1. Factors

Several factors may be responsible for rupture of the uterus, including advanced maternal age, overdue pregnancy, macrosomia, a shorter interval of deliveries, single-layer uterine closure, multiple previous cesarean deliveries, trial of labor after cesarean



Figure 5. An urgent abdominal ultrasonogram revealed an empty uterus (yellow arrow). A singleton dead fetus with complete amniotic sac outside the uterine cavity was observed (white arrow).

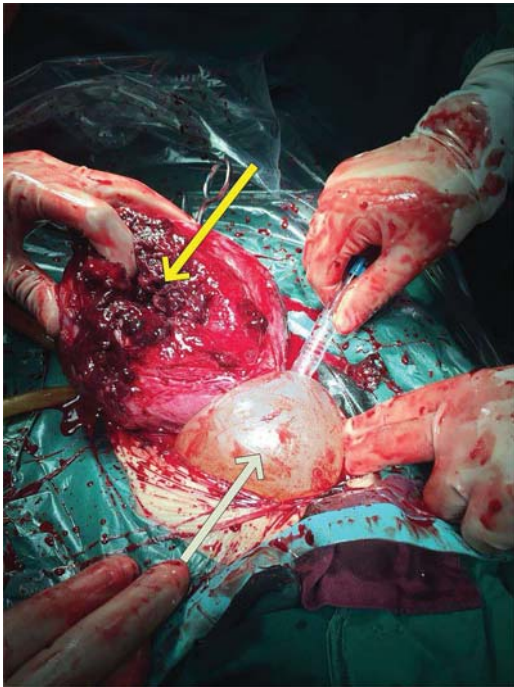


Figure 6. A defect of 10cm at the bottom of the uterus (yellow arrow). Complete herniation of membranes with amniotic fluid and a dead fetus inside it was observed near the empty uterus (white arrow).

section,^[4] bicornuate uterus,^[5] laparoscopic or abdominal myomectomy or adenomyomectomy,^[6–8] and hysteroscopic surgery.^[11] As we have previously reported, interstitial pregnancy treated with uncomplicated laparoscopic cornual wedge resection and laparoscopic salpingectomy can also lead to UR.^[9,10] There are some other factors for UR due to placenta percreta to which we need to pay close attention, including in vitro fertilization (IVF) pregnancy.^[11]

In addition to the factors above, we found some special cases of placenta percreta or uterine rupture. The unique association between myotonic dystrophy (MD) and abnormally invasive placentation (placenta increta and percreta) has been considered.^[12] B-Lynch suture and Shirodkar cerclage^[13,14] may cause UR in the pregnancy, and endometrial ablation may be another cause of placenta percreta and UR.^[15] Smid et al^[16] presented a case of posterior UR in the setting of rapidly developing twin–twin transfusion syndrome (TTTS) with the rapid development of polyhydramnios of the uterus, resulting in uterine overdistension. Rarer is a spontaneous UR at 14 weeks of gestation in a Turner patient as reported by Masia et al,^[17] where the pregnancy was produced from oocyte donation and in vitro fertilization. It was emphasized that the uteri of Turner syndrome patients are frequently hypoplastic and possibly made more fragile by conjunctive tissue anomalies.

Uterine rupture after laparoscopic myomectomy depends upon wound healing that is affected by various factors, such as the method and tools used for uterine incision, unsuccessful hemostasis, and closing of the myometrial defect.^[18] In our study, various types of instruments were used in previous operations, and thus, how the uterine horn was stitched remained unclear in case 2.

Investigators in one study^[19] pointed out that the risks of complications vary according to the type of hysteroscopy.

Myomectomy had the highest incidence of complications, and diagnostic hysteroscopy and polypectomy had the lowest risks. In our case 3, the rupture of the uterus might have been caused by deep cutting, which resulted in the thinning of the bottom of the uterus.

3.2. Auxiliary diagnostic method

Computer tomography (CT) is not the first choice for imaging examinations of pregnant women with abdominal pain due to complications of radiation; we normally choose ultrasonography first, as some case reports describe the usefulness of ultrasonography in the diagnosis of UR.^[20] However, its accuracy is often affected by low resolution and gas in the enteric cavity. Some authors^[21,14] suggest that CT is more useful than ultrasonography in the diagnosis of UR, while others^[22,23] prefer magnetic resonance imaging (MRI). If an MRI examination had been performed on case 1, the diagnosis of appendicitis might have been ruled out, and the diagnosis of UR due to placenta percreta might have been clearer. Thus, hemodynamic shock may have been avoided. Case 2 and 3 were not suitable for further CT or MRI examination due to low blood pressure. Therefore, we believe that ultrasonic examination is the first choice for these patients. An emergency CT examination or MRI should be considered when the patient's condition permits.

3.3. Therapy

There are 2 reports in the literature in which patients accepted immediate repair of the uterine defect and the pregnancy was prolonged.^[22,24] In our cases 1 and 2, there was not only UR, but also placenta percreta with active bleeding. In response, we used a different approach relative to the 2 reports mentioned above: we first removed the fetus and then repaired the uterus. In case 3, the pregnancy could obviously not be prolonged.

3.4. Prevention

In our reports, case 1 became pregnant again 3 months after laparoscopic salpingectomy due to right isthmus pregnancy, while case 2 required 4 months and case 3, 5 years. We wished to ascertain the safe interval between endoscopic treatment and conception. We reviewed the literature and read a study about URs from Taiwan^[4] where the mean interval between pregnancy and prior surgery was 43.3 ± 9.0 months. In some case reports, the interval between laparoscopic salpingectomy with resection of the interstitial portion and the pregnancy was 4 years^[9] and 8 months.^[20] Other authors^[10] presented one case of a spontaneous, complete UR during pregnancy, where the patient had a past history of dilatation and curettage for an abortion and a monolateral laparoscopic salpingectomy for an ectopic pregnancy 9 years before. In another study,^[8] the interval between laparoscopic adenomyomectomy and conception was >11 months.

Based on the available data, we believe that it is not possible to determine a safe interval, and the risk of UR during subsequent pregnancy cannot be completely excluded even after several years.

It is suggested in some case reports^[18,20] that uterine ruptures may be tied up with poor vascularization and necrosis of myometrium due to the extensive use of electrosurgery, although these are speculative. After all, we will focus on such questions in

future works. For example, the exact mechanisms by which laparoscopic or hysteroscopic interventions to the uterus can increase the risk of uterine rupture. What we can do now may be to decrease the use of electrosurgery, and improve the quality of suture material and suturing techniques.

In addition, we need to manage patients who have a history of such surgeries in high-risk obstetric clinics. If necessary, ultrasonography or MRI can be performed to assess the thickness and continuity of scars in suspicious areas.

4. Conclusions

In conclusion, it must be emphasized that pregnant women with a history of laparoscopic removal of ectopic pregnancy or hysteroscopy should be subject to special care.

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Baojing Zhao: Data collection, Literature review, Manuscript writing.

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Ying Zhang: Manuscript writing.

Project administration: Ying Zhang.

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Writing – original draft: Baojing Zhao.

Writing – review & editing: Baojing Zhao, Ying Zhang.

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