

Perioperative Nursing Care of a Patient at 24 Weeks of Gestation with Spontaneous Uterine Rupture: A Case Report

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Abstract

Background: Uterine rupture is usually a catastrophic event. Although a sole uterine repair may also delay delivery, it can be surgically challenging and easily complicated, leading to significant maternal or fetal morbidity. Appropriate nursing care for these patients with uterine repair could positively influence maternal and neonatal outcomes.

Case report: A 31-year-old married pregnant woman was admitted with a prior scarred uterus due to a previous cesarean section. The four-dimensional B-ultrasound examination at 24 weeks of gestation showed that the myometrium of the cesarean section incision at the lower end of the mother's uterus was missing. After comprehensive diagnosis and treatment of ultrasound, obstetrics, neonatology, radiology, urology, and other disciplines, the patient was diagnosed with pregnancy scar uterus combined with incomplete uterine rupture. On the 13th day of admission, the patient was diagnosed with asymptomatic uterine rupture by ultrasonography, which indicated that local absence of muscularity in the lower anterior uterine wall with a length of 3.7 cm. The patient received surgical repair at 26 weeks of gestation, which placed the patch at the position where the myometrium was missing, sutured the uterus, and completely closed the bulging amniotic sac. Patients with uterine repair after incomplete uterine rupture have complex care requirements. We closely observe the response

of the patient to the use of systolic inhibitors and perform fetal heart rate monitoring, maternal vital sign monitoring, and psychological reassurance. Finally, a live birth baby was born at 34⁺³ weeks of gestation.

Conclusions: The physical and psychological rehabilitation of pregnant women with asymptomatic uterine rupture, especially the health of the fetus, can be conducted via a full multidisciplinary preparation before the surgery. Providing appropriate perioperative care especially the management of perioperative contractions can reduce the possibility of postoperative uterine rupture, achieve continued pregnancy, neonatal outcomes, and maternal preservation of maternal future fertility.

Keywords: Asymptomatic uterine rupture; Perioperative nursing; Uterine repair; Second trimester

Background

Uterine rupture is a serious and rare pregnancy complication, which can occur in the third trimester of pregnancy or even before delivery, with mild or asymptomatic symptoms [1]. Uterine rupture is associated with perinatal morbidity (20.8%) and mortality (64.6%) rates [2]. The incidence of uterine rupture in the scarred uterus is 5.1 per 100, 000 deliveries [3]. Spontaneous uterine scar dehiscence during pregnancy refers to the separation of the myometrium in the scar and the integrity of the serous layer, which may progress to complete uterine rupture at any time. However, few cases have been reported in the literature about taking appropriate medical intervention measures for asymptomatic spontaneous uterine scar dehiscence before it progresses to complete uterine rupture [4,5]. Here we reported how to care for a case of continuous pregnancy after the successful repair of incomplete uterine rupture at 26 weeks of gestation, and successful prolongation of gestation to 34⁺³ weeks gestation.

Case Presentation

A 31-year-old pregnant woman conceived spontaneously. Her first pregnancy was at the age of 26 years, and she received the lower segment of the uterus cesarean section at 38 weeks of gestation at a different medical institution. The cesarean section was conducted because of fetal hypoxia. Before this pregnancy, the patient had undergone two abortions, both occurring in early pregnancy at 8 weeks of gestation. This pregnancy was her fourth pregnancy, which was 12 months after her last pregnancy and 55 months after her successful cesarean delivery. During the antenatal care, the first occurrence of thin myometrium in this pregnancy was at 20 weeks of gestation, with myometrium of 0.44 cm (from an ultrasound examination) and without abdominal pain and vaginal bleeding. She was referred to our hospital at 24 weeks of gestation. The ultrasound examination revealed that the lower part of the anterior wall of her uterus was right of center with no muscular echo and the length was about 3.7 cm, 0.4 x 0.2 cm. The liquid dark area can be seen in its center; the local plasma layer protrudes towards the bladder; the continuity of the plasma layer was still possible, and 2.7 x 1.0 cm vascular plexus echogenicity can be seen on the bladder surface at 25 weeks of pregnancy (Figure 1). The emergency B-ultrasound examination was indicated in Table 1. Magnetic Resonance Imaging (MRI) further revealed thin myometrium in the anterior wall of the lower uterine segment, with a cystic-like forward expansion of the amniotic sac (approximately 2.3 cm in depth and 4.9 cm in width) and with an intact plasma layer (Figure 2). Before the medical procedure, patients were informed of the potential risks and benefits of the intervention and informed consent was obtained.

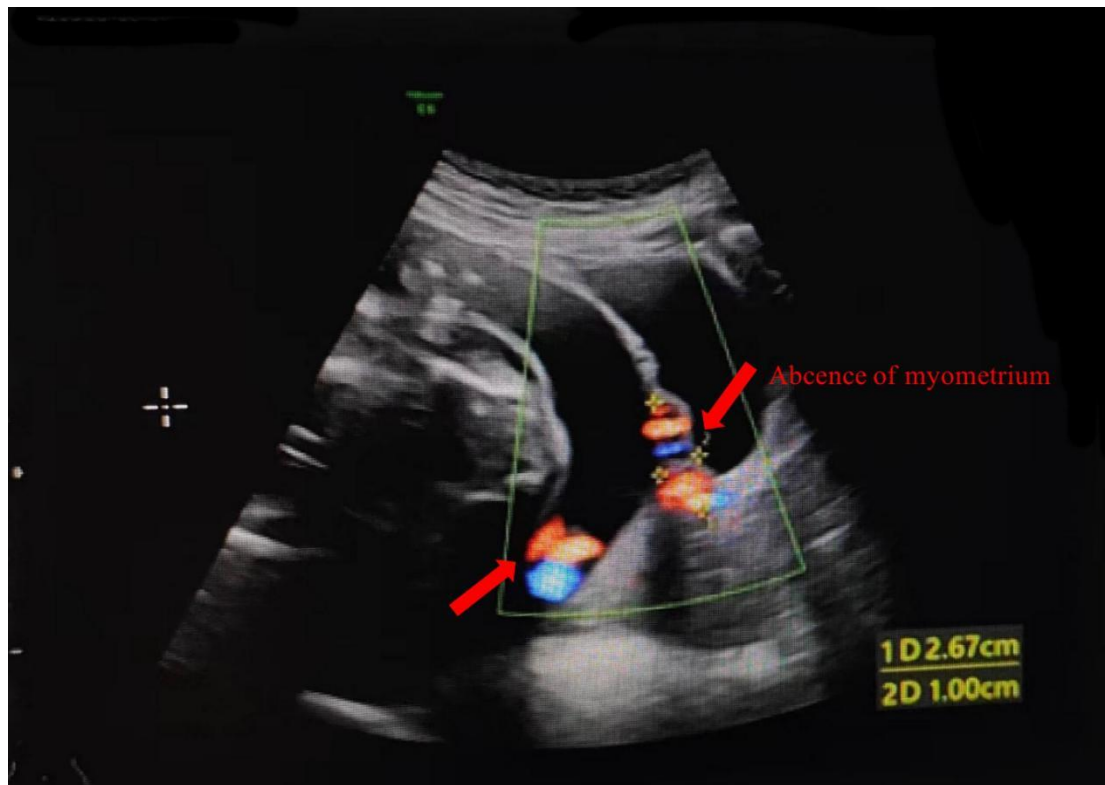


Figure 1: Vaginal ultrasound examination at 25 weeks of gestation.

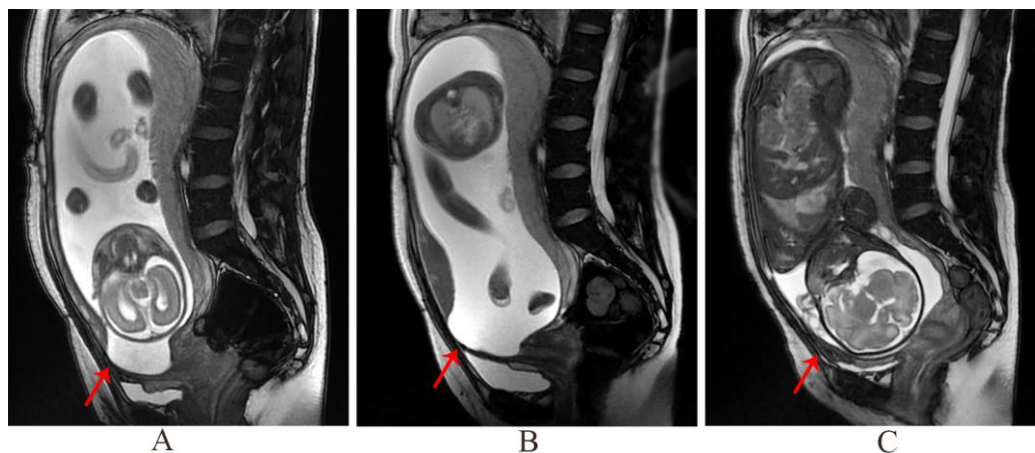


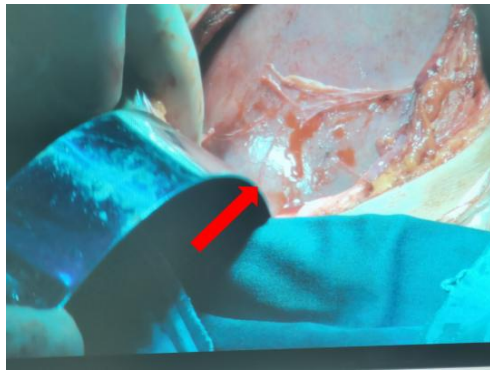
Figure 2: Magnetic resonance imaging (MRI) at 25 weeks of gestation.

Table 1: The emergency B-ultrasound examination at 25 weeks of gestation.

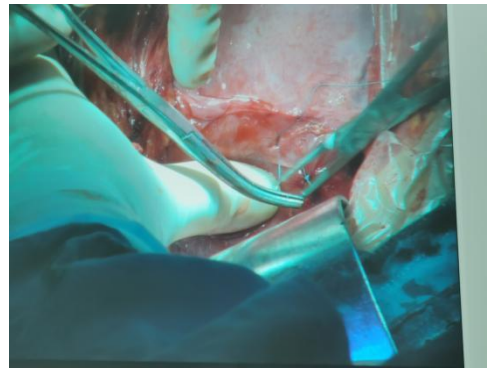
Indicator	Measurements
Fetal position	right sacrum anterior
Fetal heart rate	143 beats/min

Fetal movement	accessible
Biparietal diameter	6.7 cm
Head circumference	25.3 cm
Femoral length	4.8 cm
Abdominal circumference	23.6 cm
Placenta of posterior wall	Gr I
Amniotic fluid index	18.7 cm
Umbilical artery S/D ratio	2.3
Perfusion index (PI)	0.92

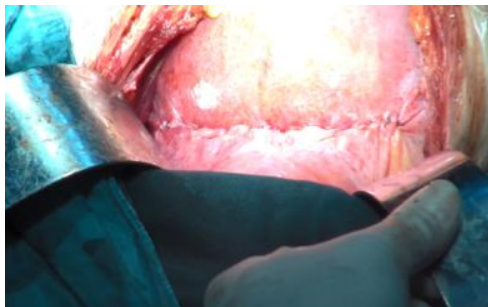
Considering both the mother and the fetus faced serious life-threatening risks in the event of uterine rupture, uterine scar repair was performed in the Operating Room (OR) at 26⁺³ weeks of gestation with a biological patch (The Aegis Help W10B52, which was placed between the myometrium and the reflexed peritoneum). After opening the peritoneum of the retroflexed bladder, the uterine cleft area is visible and the amniotic sac is clearly convex, and the fetal body underneath is clearly visible (**Figure 3a**). We gradually tightened the myometrium on the outside of the amniotic sac and completely closed the bulging amniotic sac with approximately 11 cm long sutures. The biological patch (measuring 12 × 4 cm) was placed over the uterine incision suture and fixed at the uterine weak point. The upper edge of the patch was placed approximately 2 cm from the suture surface and intermittently sutured to the myometrium (**Figure 3b**). The inferiorly pushed reflexed peritoneum was covered by the patch and sutured (**Figure 3c**). The ultrasound was performed on the 4th postoperative day (**Figure 3d**).



(a)



(b)



(c)



(d)

Figure 3: (a) After opening the peritoneum of the retroflexed bladder, the uterine cleft area is visible and the amniotic sac is clearly convex, and the fetal body underneath is clearly visible (the position of the arrow). (b) Uterine suturing: fixing the weak point of the uterus. (c) The inferiorly pushed reflexed peritoneum was covered to the patch and sutured. (d) Ultrasound image after uterus repair, the position of the arrow was the site of repair.

At 34⁺³ weeks of gestation, the uterus was cut above the original scar tissue. After the successful delivery of the fetus, the original scar tissue of the uterus was cut out, the length was about 8 cm and the width was about 3 cm, which was soft and contained some unabsorbed biological patch tissue. A healthy baby was delivered with a weight of 2,430 g and Apgar scores of 9 at 1 minute and 10 at 5 minutes. Both the patient and the infant were discharged on postoperative day 6. For the successful completion of the surgical repair, we performed adequate perioperative nursing care.

Preoperative Nursing

Fetus monitoring: Nurses instructed the patient to count the fetal movements, perform fetal heart monitoring regularly, and check the fetus, placenta, and amniotic fluid by B-ultrasound without abnormalities.

Intravenous preparation: One day before surgery, the internal jugular vein catheter was indwelled and the depth of retention was 12 cm. Considering the risk of failure in intraoperative uterine repair surgery, the temporary establishment of a central vein increased the risk of delaying the best time to resuscitate maternity. Using preoperative inhibitors of uterine contraction, once a cesarean section has been performed, the tendency for the uterus to contract weakly can lead to postpartum hemorrhage. Therefore, a central vein was prepared preoperatively, allowing for rapid central venous rehydration.

Tocolytic treatment for prevention of preterm birth: After admission to our department, the patient had no lower abdominal pressure, contractions, vaginal bleeding, and fluid flow. The physician recommended 25%

magnesium sulfate 30 ml plus 0.9% sodium chloride 500 ml 30 drops/min intravenous drip to inhibit contractions and prevent contractions from inducing complete rupture of the uterus. By closely monitoring the adverse effects of magnesium sulfate, the patient did not experience any adverse drug reactions. The physician worried that the uterine suture would induce contraction during the operation and further affects the fetus and the operation, so the contraction inhibitor was used before the operation. The physician suggested adjusting the magnesium sulfate to ritodrine hydrochloride 100 mg plus 0.9% sodium chloride 500 ml 5 drops/min intravenous drip 3 days before the operation. As ritodrine hydrochloride was given intravenously for a longer time, the operation was strictly aseptic. Ritodrine hydrochloride was strictly controlled as it can lead to changes in maternal and fetal heart rates and was related to the speed and concentration of intravenous dosing.

Intra-Operative Care

Psychological support: When the woman entered the Operating Room, she felt helpless, nervous, and lonely because of the high risk of uterine repair surgery. The temperature of the OR was set to 24 °C. A midwife was accompanied with the woman, informing her of the precautions for induction of anesthesia and intraoperative surgical cooperation, and answering her questions.

Prevention of venous thrombosis of the lower extremities: After entering the OR, the midwife-assisted the woman to put on compression stockings and informed her to wear them for 18 hours per day and walk appropriately after the operation.

Intraoperative surgical care coordination: Our team focused on the preparation of supplies and nursing staff, establishment of veins, intraoperative monitoring of maternal and infant health, patient transport, proper storage of biological materials, and preparation of emergency cesarean and neonatal resuscitation plans. In addition to these general obstetric surgery preparations, two special items were required for uterine repair: non-absorbable sutures and regenerative medical biological patches, which were soft tissue-inducing biological materials that can repair defective tissues through tissue remodeling. We have prepared contingency plans for multiple scenarios and have plans for possible intraoperative premature rupture of membranes or uterus rupture, which may require delivery of the fetus if it occurs. Since the fetus is only 26 weeks, resuscitation of the fetus is required.

Postoperative Nursing

Care of infections and fever: After the uterine repair surgery, the mother was transferred to the ICU with close monitoring of dryness of the incision dressing, vaginal bleeding, and the color, odor, and nature of the vaginal secretions. Her temperature was 37.8 °C in 3 hours postoperatively. The physician recommended anti-infective treatment with the antibiotic cefoperazone sulbactam sodium. The body temperature was 37.2 °C after 12 hours of medication and returned to normal at 36.8 °C after 20 hours. On the 3rd postoperative day, the patient was encouraged to get out of bed to facilitate the discharge of vaginal secretions and observe vaginal bleeding.

Pain management: A Visual Analog Scale (VAS) was used to assess the pain level by nurses. This patient was relieved by epidural paroxysmal pain administration with a postoperative VAS score of 1. No severe pain was observed. When the patient was in moderate pain (VAS score of 4-6), the nurse contacted the anesthesiologist to adjust the amount of epidural paroxysmal medication administered. An intermittent increase in the paroxysmal medication dose was effective. The patient's pain score was 4 in 35 hours after surgery, and a pethidine

hydrochloride injection of 50 mg intramuscularly was administered by her doctor's recommendation.

Tocolytic treatment for prevention of preterm birth: If contractions were frequent, the repaired incision was prone to splitting, potentially leading to a failed operation. The use of contraction inhibitors was crucial. The patient was maintained at 5 drops/min during surgery with ritodrine hydrochloride 100 mg plus 0.9% sodium chloride 500 ml. Postoperatively, ritodrine hydrochloride was administered at 20 drops/minute intravenous drip. Fetal heart monitoring showed frequent contractions and the mother had chest tightness. Nurses were informed that 1 hour postoperatively intravenous ritodrine hydrochloride 100 mg plus 0.9% sodium chloride 500ml 5 drops/minute with micropump intravenous atosiban acetate 24 ml/h maintenance with additional indomethacin to suppress contraction. According to maternal tolerance and contractions, 2 hours after surgery, the doctor recommended intravenous ritodrine hydrochloride 100 mg plus 0.9% sodium chloride 500 ml adjusting to 10 drops/minute with micro pumping atosiban acetate 30 ml/h for maintenance. The maternal skin was itchy at the 6th postoperative hour, indomethacin was discontinued and observed for the woman, and 1 hour later complained that the generalized itchiness was relieved compared to the previous. The physician recommended intravenous ritodrine hydrochloride 100 mg plus 0.9% sodium chloride 500ml adjusted to 15 drops/minute with micropump intravenous atosiban acetate 24ml/h for maintenance at the 7th postoperative hour. Subsequently, other treatments were unchanged; micropump intravenous atosiban acetate was adjusted to 16 ml/h, 8 ml/h for maintenance at the 9th and 13th postoperative hours. During the use of contraction-inhibiting drugs, particular attention was paid to pregnant woman's contractions, fetal heartbeat, the presence of vaginal fluid, and premature rupture of fetal membranes.

Intestinal management: In the 2nd hour after surgery, omeprazole 40 mg plus 0.9% 100 ml was slowly administered intravenously. Changes from liquid and semi-liquid foods to a normal diet were made based on the maternal bowel function recovery. She recovered from intestinal peristalsis on the 1st day after surgery. Deep breathing, effective coughing, and ankle pump exercise were instructed for five minutes, mainly intravenous rehydration to provide nutrition for the mother. On the 2nd day after surgery, she started to eat rice soup with warm water, and we observed whether the patient had any discomfort. Because of the use of contraction-inhibiting drugs, the patient was prone to vomiting and hypokalemia. After entering a fluid diet, 2 tablets of oral potassium supplementation were used. We had to keep the patient's bowel movement normal so that constipation did not increase abdominal pressure and affect the uterine repair wound and abdominal wound healing.

Discussion

Uterine rupture was a rare and potentially catastrophic event and commonly presents with abdominal pain, loss of fetus, vaginal bleeding, and shock [6]. Because of its severe consequences, most patients should receive emergency laparotomy. However, these symptoms may be less obvious or even absent when the rupture takes place in a surgical scar [7]. Uterine rupture always occurs through previous uterine scars [8]. Close observation was done after the operation to prevent the possibility of postoperative uterine rupture and to determine whether there are other complications. Pain is a common postoperative symptom in patients, including incisional pain and uterine contraction pain. After the operation, we accurately assessed the patient's pain level and provided epidural labor within 48 hours of surgery and local injection of analgesics 48 hours later. As a result, her pain was well relieved. Deep vein thrombosis usually leads to lower extremity dysfunction, and severe pulmonary

embolism can be life-threatening. The patient had a uterine repair during pregnancy and was mainly bedridden afterward, with a high risk of lower extremity venous thrombosis. Our patient had a Caprini score of 4 and a moderate risk of venous thromboembolism. During the post-uterine repair period, the nurses observed the dorsalis pedis artery pulsation, skin temperature, color, and swelling of both lower limbs every shift. Encourage patients to move around in bed without affecting contractions to promote blood circulation in the lower limbs. Drug interventions for our patient mainly included antibiotics and tocolytic treatment drugs. Before we provide Cefoperazone sodium sulbactam sodium, we should first determine if she had a history of appropriate drug allergies. After giving the patient a skin test, two nurses made sure that the skin test was negative before administering the drug. Use of Ritodrine Hydrochloride tends to have rapid fetal heart rate, hyperglycemia, and hypokalemia, monitor fetal heartbeat during medication, and instruct to eat potassium-containing foods. In addition, we instructed her to take her medication on time and in the right amount, and not to stop or miss medication to ensure the effectiveness of treatment. Uterine scar rupture was related to the degree of myometrial contraction measured by ultrasound [7]. The combined examination of three-dimensional ultrasound and MRI can accurately judge the thickness and specific location of the defect scar. This reported case showed that the success of the surgery cannot be achieved without adequate preoperative preparation to reduce intraoperative bleeding and avoid blood transfusion. The repair operation of the uterine myometrium during pregnancy was accepted at 26 weeks of gestation [8]. At 32 weeks of gestation, we used MRI to recheck the healing of the uterine scar, suggesting that the lower segment is still thin, but the amniotic sac is not swollen, which was significantly better than before. The long-term complications of newborns born after 32 weeks of gestation will be much less. The optimal time for repeat cesarean section in women who have had a previous uterine rupture seems to be between 34 0/7 and 35 6/7 weeks of gestation [9]. From uterine repair operation to 34⁺² weeks of gestation, uterine contraction was still much more frequent although the drugs to inhibit uterine contraction were taken. Therefore, cesarean delivery is performed at 34⁺³ weeks. At present, ultrasound examination was the most commonly used method to monitor uterine scars [10]. Uterine rupture was most common in the scarred uterus. Identification of high-risk pregnancy, identifying the indications for cesarean delivery, appropriate delivery monitoring, prenatal diagnosis, and timely treatment was critical to reduce its occurrence [11]. The previous case that has been reported was emergency surgery when the uterus had ruptured. Medical measures taken are reactive and acute [4,5]. We report this case where appropriate medical interventions were taken before the uterus ruptured, which effectively prevented the rupture from occurring. Close cooperation of the medical team with the nursing care during the pregnancy can effectively reduce uterine contractility delays labor and reduce the risk of preterm delivery and its short-term adverse consequences. The combination of multipletocolytic treatments is unknown for long-term neonatal complications, which is needed to be explored in future studies.

Conclusion

It's essential to establish a multidisciplinary consultation before the operation and prepared a contingency plan for emergencies during the operation, such as saving the newborn if the uterine repair operation failed and adjusting the postoperative dosage of contraction inhibitors. Prolongation of the gestational week is associated with myometrial repair and the correct use of contraction-inhibiting drugs. As nurses, we closely observe the response of the patient to the use of systolic inhibitors to prevent postoperative uterine rupture. Meanwhile,

without interfering with the contractions, the management of intestinal, pain, and deep vein thrombosis are important.

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