Second-trimester spontaneous uterine rupture: a rare case of diagnostic nuances and multidisciplinary management

To the Editor,

Uterine rupture, characterized by the complete separation of all uterine layers, poses significant risk to both the mother and fetus (1). This condition is predominantly observed in the third trimester of pregnancy, with earlier occurrences being exceptionally rare (2). The incidence of uterine rupture is approximately 0.7 per 10,000 deliveries in unscarred uteri and 5.1 per 10,000 in scarred uteri (3). Second-trimester ruptures are typically associated with induced pregnancy terminations in scarred uteri, trauma, or complications, such as placenta accreta spectrum. Spontaneous rupture before labor in the second trimester is an extremely uncommon event (4). Notably, 80% of uterine ruptures occur between 28 and 36 weeks of gestation, with mid-trimester ruptures reported at an incidence of 1 per 5,000 deliveries (5).

Identifying risk factors, including a history of uterine rupture, previous surgery including vertical hysterotomy, and labor is important for anticipating and managing this condition. Diagnosing uterine rupture is challenging and often overlooked without a high index of suspicion. We aim to highlight the importance of early recognition and illustrate how delays in diagnosing uterine rupture can result life-threatening outcomes.

A 25-year-old, G9P2144 at 25 weeks and 6 days, presented to the emergency department with severe, diffuse abdominal pain that began 24 hours prior and progressively worsened. The pain was non-contraction-like, exacerbated by movement and respiration, and accompanied by an episode of loss of consciousness reported by the emergency medical services. She was not postictal and denied vaginal bleeding, contractions, loss of fluid, or gastrointestinal symptoms.

On physical examination, the patient appeared uncomfortable, with diffuse abdominal tenderness, a positive Murphy's sign and bilateral costovertebral angle tenderness. There were no findings of acute abdomen, such as rigidity, guarding, or rebound tenderness. The patient was unable to engage in a thorough history, until pain was better managed, revealing a complex medical background (Figure 1). Outside records were unavailable initially given that she had been receiving prenatal care outside the facility. Medical history included a cardiac history of atrial fibrillation and supraventricular tachycardia, having undergone four cardiac ablations and cardioversion during a previous pregnancy. Surgical history was only significant for a laparoscopic appendectomy and umbilical hernia repair. Obstetrically, she experienced preterm labor at 28 weeks gestation with twins, managed with a vaginal birth (baby A) and a subsequent cesarean section via a classical incision (baby B) in August 2022. During the current pregnancy, a cerclage had been placed at approximately 13 weeks gestation. Since placement, the patient had multiple presentations with similar symptoms. During these admissions, ultrasounds were completed, and no pain-related pathology was noted; a low-lying placenta was observed.

Upon initial assessment, the cardiotocography was appropriate for gestational age. However, during triage, a prolonged deceleration lasting four minutes was observed, which resolved spontaneously without intervention. The tocodynamometer showed no uterine contractions throughout this period. The patient, experiencing severe pain, intermittently refused further fetal monitoring; subsequent tracings remained within normal parameters.

The patient was tachycardic at 130 beats per minute (bpm). Vital signs including blood pressure, temperature, oxygen saturation, and respiratory rate were all within normal limits. Laboratory findings revealed an initial white blood cell count

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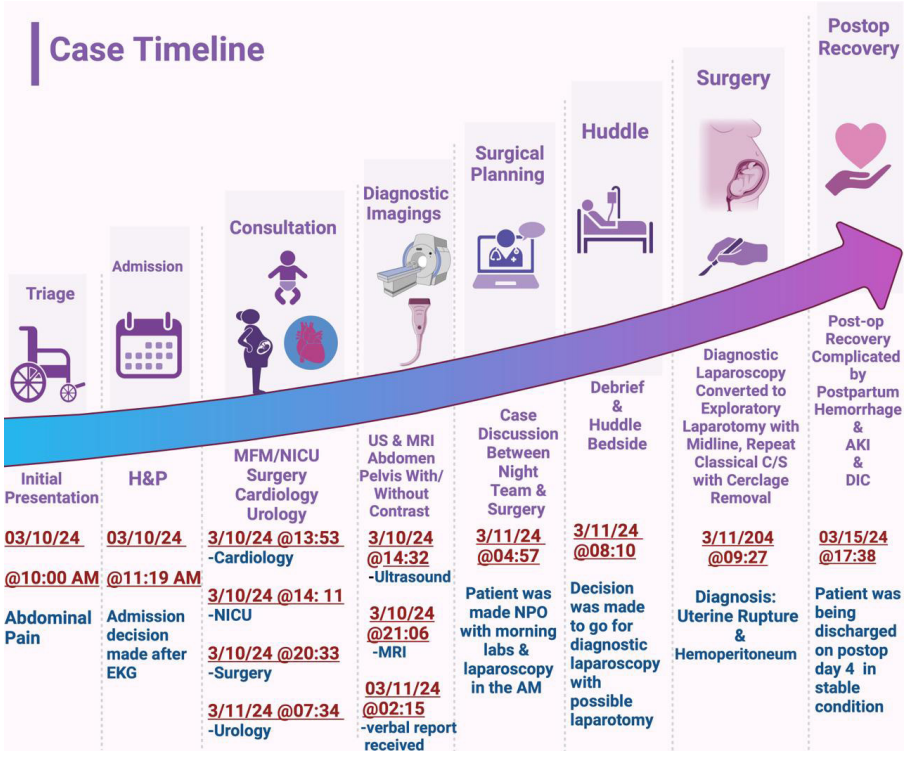

Figure 1. Chronological clinical course of maternal-fetal management: from initial assessment to postoperative recovery

of 24.7 $10^3/\mu$L, which up trended to 29.1 $10^3/\mu$L. Hemoglobin levels decreased from 9.4 g/dL to 7 g/dL. Lactate levels initially measured at 4.1 mmol/L, decreased to 2.8 mmol/L, following aggressive fluid resuscitation. Hyperkalemia at 5.8 mEq/L was noted in the setting of acute kidney injury, with a creatinine level of 1.2 mg/dL. Abdominal ultrasound showed concern for ascites, sludge in the gallbladder and right-sided nephrolithiasis. Magnetic resonance imaging (MRI) of the abdomen and pelvis identified hemoperitoneum, concerning a ruptured, hemorrhagic ovarian cyst, and a moderate-sized umbilical hernia (Figure 2).

Consultations were obtained from general surgery, urology, maternal-fetal medicine (MFM) and cardiology. Cardiology noted sinus tachycardia secondary to pain, dehydration, anemia and concern for infection. They diagnosed vasovagal syncope secondary to pain. The patient's hyperkalemia resolved. General surgery reviewed imaging, and a mutual discussion determined the best next course of action which was a co-scrubbed diagnostic laparoscopy. The patient was given betamethasone, intravenous (IV) Zosyn, one unit of fresh frozen platelets (FFP) and packed red blood cells (pRBC's).

During the diagnostic laparoscopy, a large organized haematoma was observed in the midline, which significantly restricted the visual assessment of the abdominal cavity. Consequently, the procedure was escalated to an exploratory laparotomy. Upon entry, the hematoma was evacuated and a uterine rupture at the site of the previous classical hysterotomy incision was immediately identified with the placenta anterior and visible at the site of the dehiscence. The decision was made to proceed with delivery. No other abnormalities or bleeding was noted. Cerclage was removed. The APGAR scores were 2 at 1 minute, 3 at 5 minutes, and 5 at 10 minutes. The hysterotomy was closed with Vicryl 0, in two layers, with the second being a baseball stitch. Disseminated intravascular coagulation (DIC) panel was completed intraoperatively and DIC was diagnosed with a fibrinogen of 121,000 mg/dL. The total quantitative blood loss was 3 liters. The patient received 1 unit of FFP and 5 units of pRBC intraoperatively.

Pain complicated the postoperative period. Palliative care and pain management were consulted, and pain improved with oral analgesia. The patient met all postoperative milestones and was discharged on postoperative day 4. The neonate stayed in the neonatal intensive care unit and was then transferred to another facility for evaluation and management of ventriculomegaly and intraventricular hemorrhage secondary to prematurity.

This case emphasizes the diagnostic challenges in second-trimester uterine rupture, highlighting the importance of vigilant monitoring and prompt intervention. The patient's multiple emergency department visits for similar pain-related complaints subsequent to the 14th week of gestation indicate that the initial phases of uterine dehiscence might have occurred well before the final diagnosis of complete uterine rupture. This prolonged onset is particularly noteworthy given the patient's gestational

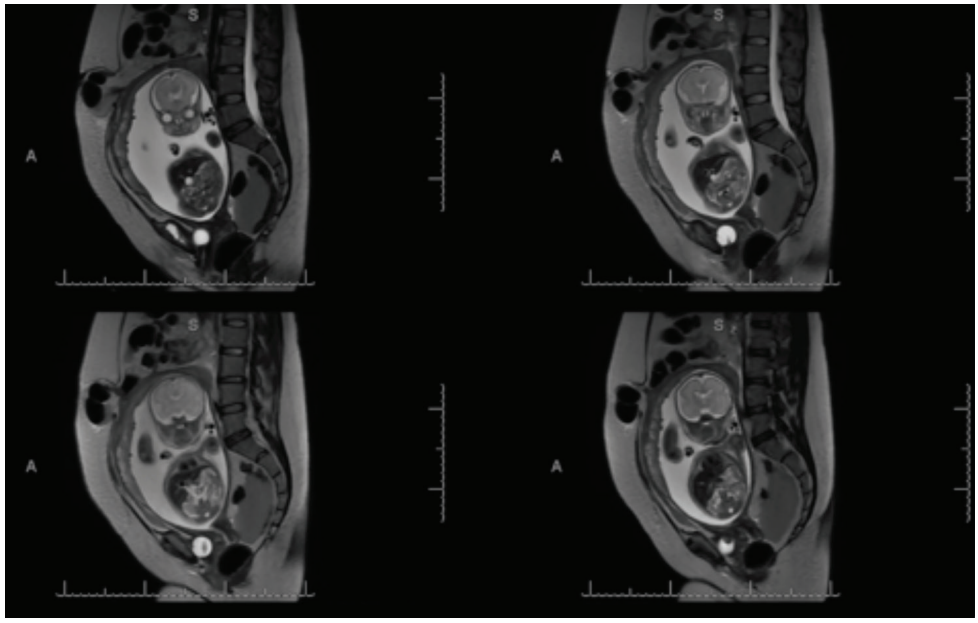

Figure 2. Non-contrast sagittal magnetic resonance imaging of the abdomen and pelvis demonstrating hemoperitoneum, ruptured hemorrhagic ovarian cyst, and umbilical hernia

age and the absence of labor contractions, which are more typical indicators of uterine distress.

Another point of interest is that following cerclage placement, the patient received hydromorphone 0.5 mg and 1 mg IV for pain control. Typically, patients with cerclage do not require IV opioids. We speculate that there is a possibility that the cerclage may have contributed to the rupture due to a combination of increased intrauterine pressure, and contractions, in the setting of the previous classical cesarean section.

Imaging, such as a focused assessment with sonography for trauma scan or MRI, should not be delayed in similar cases. In our case, imaging revealed hemoperitoneum but was unable to diagnose uterine rupture. Despite its rarity in the second trimester, this case emphasizes the need for vigilance and early recognition of symptoms, even in the absence of traditional signs, like vaginal bleeding, non-reassuring fetal heart tones or contractions.

Our management highlights multidisciplinary collaboration involving obstetrics, general surgery, cardiology, and MFM, underscoring the complexity and coordination required in such critical scenarios. Surgical intervention was vital in this case, emphasizing the role of timely surgical exploration once uterine rupture is suspected. This becomes particularly challenging in the absence of classic symptoms and signs, where delays in diagnosis and intervention can profoundly affect patient outcomes. Moreover, the onset of DIC in this patient highlights the systemic impact of uterine rupture, necessitating meticulous management, including blood products and monitoring for complications. The resolution of DIC and the patient's recovery were facilitated by comprehensive postoperative care and effective pain management strategies.

In conclusion, this report illustrates the importance of early recognition, prompt diagnostic evaluation, and decisive surgical management in uterine rupture. Clinicians should maintain a heightened awareness of this potentially life-threatening complication to optimize outcomes. Futher future research and reports will be important to refine diagnostic strategies and management protocols for uterine rupture.

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