

MRI Features and Diagnostic Challenges in Abdominal Pregnancy and its Mimickers: A Case Series

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AUTHORS' CONTRIBUTIONS

Ardhin Martdana: Manuscript drafting, writing, clinical data review, supervision, editing, corresponding author.

Lies Mardiyana: Writing, editing, references, submission

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None.

DISCLOSURES

Yes, informed consent was obtained from the patient for submission of this manuscript for publication.

CONSENT

Did the author obtain written informed consent from the patient for submission of this manuscript for publication? (Answer with yes or no.)

HUMAN AND ANIMAL RIGHTS

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5).

ABSTRACT

This study aims to present a case series of abdominal pregnancies and their mimickers, emphasizing the role of Magnetic Resonance Imaging (MRI) in diagnosis and management. The primary method used was evaluation with MRI for superior anatomical visualization. MRI successfully differentiated between an intrauterine pregnancy in a didelphic uterus (Case 1) and true abdominal pregnancies (Cases 2, 3, and 4). Key MRI features of abdominal pregnancy include: a thin-walled gestational sac, a placenta with irregular borders and heterogeneous texture, and vascularization originating from branches of the abdominal aorta. In conclusion, MRI is an invaluable imaging modality for diagnosing and assessing abdominal pregnancies. Diagnostic accuracy is enhanced by a systematic approach that includes careful anatomical assessment (aided by vaginal distension using hydrogel when necessary), analysis of placental and gestational sac wall characteristics, and evaluation of vascularization.

CASE REPORT

BACKGROUND

Abdominal pregnancy is a rare form of ectopic gestation in which the fertilized ovum implants and develops within the peritoneal cavity, excluding locations such as the fallopian tubes, ovaries, or the broad ligament [1]. Among the possible intra-abdominal sites, the Pouch of Douglas (POD) is the most common location, followed by the mesosalpinx and omentum. Implantation in less typical areas — including visceral organs such as the spleen, liver, and appendix — has also been reported in clinical literature [1-3]. Overall, abdominal pregnancies represent approximately 1–1.5% of all ectopic pregnancies, with an estimated frequency of one case per 8,000–10,000 total pregnancies [1,4].

This condition poses a significant risk to both maternal and fetal health, primarily due to the potential for catastrophic intra-abdominal hemorrhage when placental separation occurs, whether partially or completely, at any stage of gestation [1]. Epidemiological data indicate that the maternal mortality risk is nearly 7.7 times higher than in other forms of ectopic pregnancies and about 90 times greater than in intrauterine gestations [1,4]. Across global case reports, maternal mortality has been documented between 2% and 30%, while perinatal mortality in undiagnosed cases ranges from 40% to 95% [1,4,5].

The clinical presentation is often nonspecific, which contributes to the difficulty of diagnosis. Some patients

remain asymptomatic, while others present with abdominal pain, irregular vaginal bleeding, or a progressively enlarging abdomen that mimics a normal pregnancy. In everyday obstetric practice, the diagnosis may be missed or delayed, even with routine antenatal ultrasonography (USG) [4,5]. In contrast, Magnetic Resonance Imaging (MRI) offers superior diagnostic precision, enabling clearer visualization of implantation sites and providing insights into the pathophysiological mechanisms that lead to abdominal implantation [5].

In this article, we present four cases of abdominal pregnancy. The first case involves a 37-week pregnancy with a uterus didelphys that mimics abdominal pregnancy on MRI imaging. The second case is a 37-week abdominal pregnancy with the placenta adhering to the surrounding omentum, requiring laparotomy and retention of the placenta within the abdomen. Serial MRI and USG were performed to assess whether the placenta was rudimentary or not. The third case is a 29-week abdominal pregnancy with abnormal placental implantation at the uterine fundus, causing a uterine fundus defect similar to placenta accreta but with the placenta destroying the serosa to endometrium layers. The fourth case is a 30-week ectopic pregnancy complicated by intrauterine growth restriction (IUGR) and fetal death due to uterine rupture. We share the medical history, imaging findings, diagnosis, and treatment of the patients, while also reviewing and summarizing the characteristics, diagnostic approaches, and treatments of these cases at our hospital's obstetric and radiology center over the past year. Our goal is to propose [or provide] a novel framework for the management of abdominal pregnancies, particularly in the use of MRI diagnostics.

CASE REPORT

Case 1

A 27-year-old Indonesian woman, gravida 2, para 1 with previous caesarian section deliveries (the first child was 3-years-old), presented to the obstetric outpatient clinic of Dr. Soetomo Hospital at 35 weeks gestation with suspected abdominal pregnancy. Previously in February 2024, the patient experienced a delayed menstruation and performed a self-pregnancy test, which resulted in a positive outcome. The patient then visited the hospital for further examination. An ultrasound (USG) was conducted, confirming that she was pregnant. In March, the patient complained of spotting from the vaginal area. An ultrasound examination was performed, and it was diagnosed as an incomplete abortion. A dilation and curettage (D&C) procedure was carried out, and the uterus was declared clean. In May 2024, the patient did not have her period. She performed another self-pregnancy test, which again resulted in a positive outcome. From June to September 2024, the patient had routine check-ups at the hospital, where a suspicion of an ectopic pregnancy arose. She was referred to dr. Soetomo Hospital. Investigations revealed hemoglobin levels of 10.2 g/dL and a hematocrit of 29%. An MRI was subsequently performed (Figure 1).

To determine whether this case is an abdominal pregnancy or not, an evaluation of the female genital anatomical structures must be established. A 10 Fr Foley catheter was inserted into the vagina, and 10-15 cc of hydrogel was injected to open the vaginal lumen for easier evaluation. A longitudinal septum was found in the vagina, and an additional catheter was inserted into the other lumen, followed by another injection of 10-15 cc of gel. The presence of a longitudinal vaginal septum should raise suspicion of a Müllerian duct anomaly, such as uterus didelphys.

After performing the technique of catheter insertion into the vaginal lumen, the genital organ anatomical structure was clarified (Figure 2). However, it is still not possible to distinguish whether this case is an abdominal pregnancy or an intrauterine pregnancy. Additional evaluation is needed, including the thickness of the pseudomembranous gestational sac. Typically, pregnancies outside the uterus have thinner pseudomembranes compared to in-utero pregnancies because they are not supported by myometrium. The placenta evaluation is also conducted. The placenta in abdominal pregnancies tends to invade surrounding organs such as the bladder, mesentery, intestines, liver, and even the uterus, similar to placenta accreta, with irregular edges. In abdominal pregnancies, many blood vessels are found to be hypervascular, and the feeding arteries of the placenta can originate directly from the abdominal aorta, which can complicate surgical procedures. In contrast, intrauterine pregnancies have smooth placental edges and minimal or no invasion of surrounding tissues.

The patient underwent a cesarean section, and it was an intrauterine pregnancy in the right hemiuterus (Figure 3) and the patient had two uteri, appearing to be a didelphys uterus. The right ovary and right fallopian tube were within normal limits. The left hemiuterus was not enlarged, and the left ovary and left fallopian tube were also within normal limits.

The baby was born weighing 2280 grams, with a body length of 46 cm, an Apgar score of 7 and 8. The amniotic fluid was clear, the baby breathed spontaneously, and the skin color was reddish (Figure 3).

Case 2

A 28-year-old Indonesian woman, gravida 2, para 1, with a history of previous cesarean section deliveries, was referred to the emergency department of our hospital with a post-laparotomy condition from an outside facility at 37 weeks of gestation. The initial surgery was closed due to suspected abdominal pregnancy with placenta accreta adhering to the liver. Upon arrival at our hospital, a 3T MRI was performed immediately.

The same catheterization technique was employed, which involved the insertion of catheters into the bladder, vagina, and rectum. A hydrogel was injected through the vaginal catheter in a volume of approximately 10-15 cc to distend the vaginal

lumen, thereby enhancing the visualization of the vaginal and cervical structures. A single uterus was observed, in an anteflexed position, with visible fetal size within it. The uterus had one normal cervical lumen and vagina, with no signs of fistulation (Figure 4).

An ectopic pregnancy was seen with a gestational sac measuring 12.3 x 22.5 x 25.6 cm on the right side of the uterus, surrounded by a pseudomembrane with a thickness of approximately 2.53 mm, containing a singleton fetus appearing at term in amniotic fluid, with the placenta located superior to the fetus. The placenta measured 10.3 x 20.5 x 7.5 cm and an intraplacental dark band/lacunae were present. Partial attachment of the anterior side of the placenta to the anterior abdominal wall was noted, with no bulging and no attachment to the liver (distance from the liver approximately 5.1 cm). The placenta showed attachment to the mesentery (Figures 5a-5c) and probable vascularization from abdominal aorta branches (Figure 5d).

A laparotomy was performed for fetal evacuation, revealing at term fetus enveloped in amniotic fluid, which extended to the posterior aspect of the uterus and into the abdominal cavity. Upon incision of approximately 2 cm in the amniotic membrane, free from placental attachment, clear amniotic fluid was noted. The fetus was delivered via foot extraction, resulting in the birth of a male infant weighing 2900 grams and measuring 50 cm in length. The Apgar scores recorded were 4, 6, and 7. Following the exteriorization of the uterus and placenta, it was observed that the intestines were adherent to the posterior side of the placenta, with sigmoid colon attachment on the left side (Figures 6a-6c). It was decided to leave a portion of the placenta, measuring approximately 10 x 8 cm, in situ (Figures 6d,6e).

To monitor the success of the rudimentary remnants of the placenta retained within the abdominal cavity, periodic assessments of beta-human chorionic gonadotropin (β -hCG) levels were performed. The initial measurement of β -hCG was conducted 14 days post-operatively, resulting in a value of 1327 mIU/ml at 14 days, 245 mIU/ml at 34 days post-operatively, and 0.563 mIU/ml at 65 days post-operatively.

MRI was performed 41 days post-operatively to measure the size of the placenta compared to previous MRI assessments. There was a 21% reduction in placental size and the placenta exhibited a change in intensity, becoming more heterogeneous and containing more fibrous and ischemic tissue (Figure 7).

Ultrasound was performed 65 days post-operatively, revealing the presence of a gestational sac containing the placenta, with a size reduction estimated at -11% compared to previous measurements (Figure 8).

Case 3

A 43-year-old Indonesian woman was referred from another hospital to our facility with a diagnosis of gravida 3, para 2 at 29 weeks of abdominal pregnancy, with a previous history

of uterine rupture and HIV positive. The patient frequently complained of abdominal pain and a sensation of contraction, with no vaginal bleeding. The results of the hemoglobin test were 10.8 g/dL, the thrombocyte count was $284 \times 10^3/\mu\text{L}$, and the leukocyte count was $8.44 \times 10^3/\mu\text{L}$. A serial blood test was performed to evaluate for probable internal bleeding while awaiting the fetus to reach a sufficient gestational age for delivery. The ultrasound examination revealed a defect in the uterine fundus with a diameter of 1.23 x 0.83 cm, and the fetus was located outside the uterus.

MRI was performed to achieve better anatomical visualization. A single uterus was observed in an anteflexed position, with no fetus identifiable within it. An ectopic pregnancy was present, characterized by an amniotic sac located on the superior aspect of the uterus, surrounded by a pseudomembrane with a thickness of approximately 1.0-2.0 mm, containing a singleton fetus within adequate amniotic fluid. An exophytic placenta was attached to the outer wall of the fundus extending to the corpus, with indistinct borders on the serosa and myometrium in that area, accompanied by placental bulging. An intraplacental dark band/lacunae was noted, with placental dimensions measuring approximately 9.2 x 12.3 x 13.0 cm. The placenta was vascularized by both the right and left uterine arteries. Notable dilation and tortuosity of the right and left uterine arteries in segment S2 were observed, running between the serosa and myometrium from the distal corpus to the fundus and then to the placenta. Adhesion of the placenta to the omentum was noted (Figure 9).

A laparotomy was performed based on clinical indications. Intraoperatively, cloudy amniotic fluid was observed in the abdominal cavity, and an extrauterine fetus was identified. The infant was delivered via foot extraction, weighing 1100 grams and measuring 39 cm in length, with an APGAR score of 5-7. The placental implantation was noted to originate from within the uterus, extending through a defect in the right uterine horn, which was covered by omentum. An omentectomy was carried out, followed by the exteriorization of the uterus. A right salpingectomy and left Pomeroy tubal ligation were subsequently performed. Ligature was applied to the area surrounding the defect, and excision of the defect was conducted. The placenta was delivered, and closure of the defect was achieved (Figure 10).

Case 4

A 33-year-old Indonesian woman was referred from another hospital to our facility with the diagnosis of gravida 2, para 1, at 30 weeks of abdominal pregnancy, accompanied by uterine rupture and fetal death. She presented with intermittent right abdominal pain for one month, accompanied by decreased fetal movement, and reported no nausea or vomiting. The patient had been involved in a motorcycle accident seven months prior, which she did not initially report to a healthcare provider as she experienced no immediate complaints. However, she had been receiving routine antenatal care at a midwifery clinic once a month before being referred to an obstetric specialist due to

her history of caesarean section and decreased fetal heart rate for the past month. The hemoglobin test was 11.0 g/dL, the thrombocyte count was $303 \times 10^3/\mu\text{L}$, and the leukocyte count was $8.45 \times 10^3/\mu\text{L}$.

Magnetic resonance imaging (MRI) was performed promptly to serve as an anatomical reference during the surgical procedure. A defect was observed in the right anterolateral wall of the uterus measuring approximately 4.4 x 4.7 cm, with a portion of the placenta inserting in that area. An extrauterine pregnancy was identified, characterized by a gestational sac measuring 10.4 x 12.0 x 20.1 cm located on the right side of the abdominal cavity, with the fetal head positioned distally. Additionally, a placenta measuring 7.0 x 5.8 x 4.6 cm was noted to be attached to the defect extending from the corpus to the fundal region of the uterus. No abnormal hypervascularization was detected in either the uterus or placenta (Figure 11).

During the operation, an amniotic sac was found beneath the peritoneum and placental implantation was observed on the anterior corpus to the fundus of the uterus. The uterus was found to be enlarged, comparable to a 12-14 week gestation. A total uterine rupture was identified on the right lateral aspect, extending from the isthmus to the fundus for a length of 5 cm. Additionally, there was a lateral left uterine adhesion to the ileum. The right and left uterine arteries were ligated, and a hysterectomy was performed in the area of rupture.

DISCUSSION

From the aforementioned cases, we identified a case of uterus didelphys that mimicked abdominal pregnancy. It is important to differentiate between intrauterine and extrauterine pregnancy by highlighting the differences in characteristics between the placenta in uterine rupture and implantation defects in the uterus, as well as variations in the characteristics of the placenta and the outer wall of the gestational sac in intrauterine and extrauterine pregnancies. Therefore, when preparing the final report from MRI findings, it is essential to adopt an appropriate approach that considers anatomical aspects, techniques, and recognition of the characteristics of the placenta and gestational sac wall, as well as the fetus, along with any relevant vascular evaluations.

Identifying Anatomical Structure

Identifying anatomical structure is a foundational step in the MRI evaluation of the female pelvis. This involves determining the presence and morphology of the vagina, cervix, and uterus to assess for congenital or acquired abnormalities. Anomalies such as Müllerian duct anomalies, exemplified by conditions like uterus didelphys with a non-obstructing longitudinal vaginal septum, can create an appearance that mimics a fetus located outside the uterus, complicating diagnosis [6,7]. The evaluation of the uterus includes assessing its size, the presence of defects such as uterine dehiscence or rupture, and the relationship of these defects to the placenta and fetus. These factors are critical for understanding the underlying pathophysiology and

distinguishing between acute, chronic, or traumatic defects [8]. For instance, in one case, an enlarged uterus exhibited heterogeneous signal intensity with irregular borders associated with the placenta, alongside placental heterogeneity and peri-placental hypervascularization. In contrast, a trauma-related defect in another case presented with regular margins, homogeneous uterine signal, a contracted placenta, and no significant hypervascularization.

To enhance anatomical evaluation, we employed a technique involving catheterization and injection of hydrogel into the vaginal lumen to distend the vagina lumen. This method clearly delineates the vaginal contour and helps identify septa and anatomical features at the cervical os. While the use of intravaginal contrast (e.g., gel, fluid) is well-established to improve visualization in pelvic MRI [9,10], our application of this technique for this specific diagnostic challenge is based on our institutional experience. This approach can obviate the need for repeat MRI examinations, assist in identifying conditions such as hematometra or hematocolpos, and provide a valuable surgical roadmap for gynecological surgeons.

Placenta and Gestational Sac Wall

In the first case, we also observed a relatively thin gestational sac wall resembling that of abdominal pregnancy; however, this wall appeared thicker compared to that in the second case. In this instance, the placenta exhibited a more homogeneous intensity and smoother edges than in case two, which involved abdominal pregnancy. In cases of abdominal pregnancy, placentas tend to have more irregular edges and heterogeneous texture due to their attempts to anchor to surrounding tissues for vascular supply, a characteristic finding in extrauterine implantation [11,12]. Consequently, during surgical procedures, it becomes challenging to detach the placenta from adjacent tissues, particularly from the omentum, leading surgeons to often leave portions of the placenta within the abdominal cavity to mitigate the risk of severe hemorrhage, a well-documented management strategy [13,14].

Fetal Evaluation

The initial assessment of the fetus involves determining whether its size corresponds appropriately to the gestational age. Several standard biometric indicators are used for this purpose, including biparietal diameter (BPD), occipitofrontal diameter (OFD), and femur length [15]. An additional critical aspect is assessing the umbilical cord to ensure it is properly connected between the fetus and the placenta. This comprehensive evaluation allows for conclusions regarding whether the fetus is experiencing intrauterine growth restriction (IUGR), whether it is alive or deceased, and if there are any congenital anomalies present [16]. The report generated from this evaluation is intended to assist clinicians in assessing fetal status, particularly in determining the timing for potential delivery or continued observation, such as monitoring pulmonary maturation and overall maternal and fetal conditions. Identifying abnormalities

that may have long-term effects or pose a high risk to fetal survival will be a key consideration in patient management.

Identifying Complications

The complications associated with abdominal pregnancy are severe and can include massive hemorrhage from the placenta, sepsis, renal failure, disseminated intravascular coagulation (DIC), bowel obstruction or perforation, fistula formation, anemia, and pulmonary embolus. During MRI examinations, hemoperitoneum is frequently identified as a sign of acute bleeding, a common and life-threatening complication. Furthermore, bowel perforation can be caused by the direct invasion of the placenta into the bowel wall, which may result in pneumoperitoneum [13,17]. The prompt identification and reporting of these complications are critical for clinical decision-making, as they directly influence the urgency and priority of intervention to save the mother's life. In cases where hemoperitoneum is suspected, it is recommended to add a T1 fat saturation sequence to the MRI protocol, as this sequence is highly sensitive for detecting acute blood products by suppressing the signal from fat and highlighting methemoglobin [18].

TEACHING POINT

MRI is an indispensable diagnostic tool for confirming abdominal pregnancy and differentiating it from mimickers like uterine anomalies or rupture, which is crucial for preventing catastrophic maternal hemorrhage. Key MRI findings that confirm an extrauterine gestation include the identification of a fetus outside the uterine cavity, a surrounding thin pseudomembranous sac, and a placenta with heterogeneous signal, irregular borders, and abnormal vascularization from abdominal aortic branches rather than the uterus.

QUESTIONS

Question 1: Based on the case series, why is it critical to evaluate for Müllerian anomalies before diagnosing an extrauterine pregnancy? (More than one answer may apply.)

1. A fetus within a malformed or septated uterus can be mislocated on imaging and mistaken for an extrauterine fetus. (applies)
2. Müllerian anomalies like uterus didelphys always result in abdominal pregnancy and therefore confirm the diagnosis.
3. Anatomical distortions from anomalies can obscure the clear visualization of the uterus, making it difficult to confirm if the gestation is inside or outside. (applies)
4. The presence of a uterine anomaly eliminates the possibility of a normal intrauterine pregnancy.
5. Specific techniques, like vaginal hydrogel distension, can reveal a double uterus and cervix, explaining what was initially thought to be an absent intrauterine pregnancy. (applies)

Explanation for the answers:

1 Applies: The manuscript describes a case where a patient with uterus didelphys was initially suspected of having

an abdominal pregnancy because the fetus appeared "superior to the uterus" on MRI. The anomaly created an appearance that mimicked a fetus located outside the uterus. [Case One & Discussion, "Identifying anatomical structure" section]

2 Does not apply: The article presents a case of uterus didelphys where the pregnancy was, in fact, intrauterine (within the right hemiuterus), demonstrating that these anomalies do not confirm an abdominal pregnancy but can mimic it. [Case One]

3 Applies: The article emphasizes that anomalies such as uterus didelphys can complicate diagnosis and that a foundational step in MRI evaluation is to determine the presence and morphology of the uterus to assess for such abnormalities. [Discussion, "Identifying anatomical structure" section]

4 Does not apply: The case report directly contradicts this, as the patient with a uterus didelphys (a Müllerian anomaly) successfully carried an intrauterine pregnancy in one of her hemiuteri. [Case One, Fig. 3]

5 Applies: The case series highlights the use of a technique involving catheterization and hydrogel injection to distend the vaginal lumen. This method was used to identify a longitudinal vaginal septum and clarify the presence of a uterus didelphys, which ultimately changed the diagnosis from a suspected abdominal pregnancy to an intrauterine one. [Case One]

Question 2: According to the case series, which of the following is a key reason Magnetic Resonance Imaging (MRI) is considered superior to ultrasonography (USG) for diagnosing abdominal pregnancy?

1. It is more readily available in all clinical settings.
2. It is the preferred method for serial beta-hCG monitoring.
3. It provides clearer visualization of the implantation site and pathophysiology. (applies)
4. It is the only imaging modality that can confirm fetal viability.
5. It eliminates the need for any surgical intervention.

Explanation for question 2:

The article states that while diagnosis may be missed with routine ultrasonography, "Magnetic Resonance Imaging (MRI) offers superior diagnostic precision, enabling clearer visualization of implantation sites and providing insights into the pathophysiological mechanisms that lead to abdominal implantation." [Introduction, Paragraph 3]

Question 3: In the context of diagnosing a potential abdominal pregnancy, what is the primary diagnostic utility of the described technique involving vaginal catheterization and hydrogel injection during an MRI?

1. To directly visualize the placental blood supply from the abdominal aorta.
2. To measure the exact thickness of the gestational sac pseudomembrane.
3. To clearly delineate vaginal and cervical anatomy and identify anomalies like septa. (applies)

4. To assess the vascularity of the placenta for signs of accreta.
5. To determine the exact gestational age of the fetus.

Explanation for question 3:

The manuscript explains that this technique is used to "distend the vaginal lumen, thereby enhancing the visualization of the vaginal and cervical structures." It is further noted that this method "clearly delineates the vaginal contour and helps identify septa and anatomical features at the cervical os," which is crucial for evaluating Müllerian anomalies that can mimic an abdominal pregnancy. [Case One & Discussion, "Identifying anatomical structure" section].

Question 4: Based on the case descriptions, which of the following placental characteristics is most suggestive of an abdominal (extrauterine) pregnancy compared to an intrauterine pregnancy?

1. Smooth placental edges with minimal invasion.
2. Homogeneous texture and regular margins.
3. Vascularization primarily from the uterine arteries.
4. Irregular edges and heterogeneous texture due to anchoring to surrounding tissues. (applies)
5. A contracted size and lack of significant hypervascularization.

Explanation for question 4:

The article contrasts the two conditions, stating that "In abdominal pregnancies, placentas tend to have more irregular edges and heterogeneous texture due to their attempts to anchor to surrounding tissues for vascular supply, a characteristic finding in extrauterine implantation." In contrast, intrauterine pregnancies are described as having "smooth placental edges and minimal or no invasion of surrounding tissues." [Case One & Discussion, "Placenta and Gestational Sac Wall" section].

Question 5: Which MRI sequence is specifically recommended in the article to improve the detection of a suspected hemoperitoneum, a life-threatening complication of abdominal pregnancy?

1. T2-weighted sequence
2. T1 fat saturation sequence (applies)
3. T2 HASTE sequence
4. Diffusion-weighted imaging (DWI)
5. T1 without contrast

Explanation for question 5:

In the "Identifying Complications" section, the article advises that "in cases where hemoperitoneum is suspected, it is recommended to add a T1 fat saturation sequence to the MRI protocol, as this sequence is highly sensitive for detecting acute blood products." [Discussion, "Identifying Complications" section].

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FIGURES

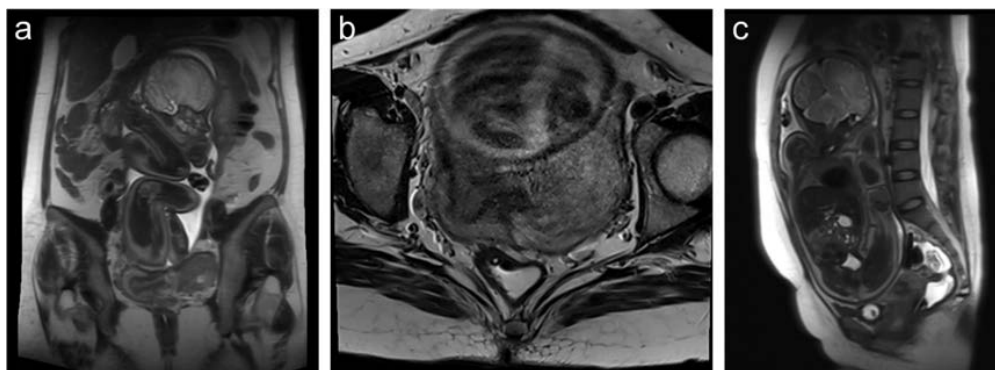


Figure 1: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI). The image shows the uterus located on the right side. The fetus appears superior to the uterus, suggesting an extrauterine position. The vagina and cervix are difficult to evaluate due to a Müllerian anomaly.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view.

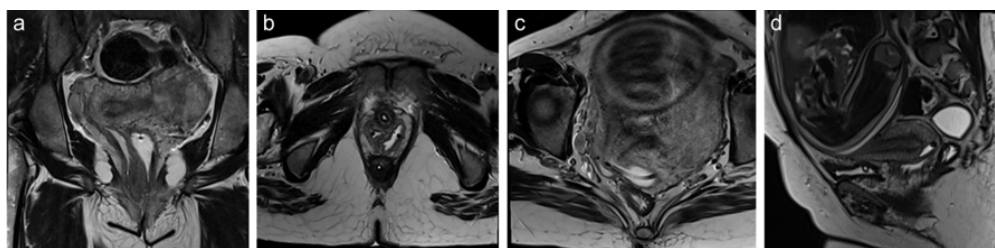


Figure 2: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI).

- (a) Coronal view: A 10 Fr Foley catheter was placed in the vagina, with instillation of 10-15 cc of hydrogel to distend the vaginal lumen for improved evaluation. The hyperintense hydrogel clearly delineates a longitudinal vaginal septum, suggestive of a Müllerian anomaly, most consistent with a didelphys uterus.
- (b) Axial view: The hyperintense hydrogel clearly defines the separate right and left vaginal lumina.
- (c) Additional axial view further demonstrating the cervix.
- (d) Sagittal view: The interface between the uterine wall and the fetus remains poorly delineated.

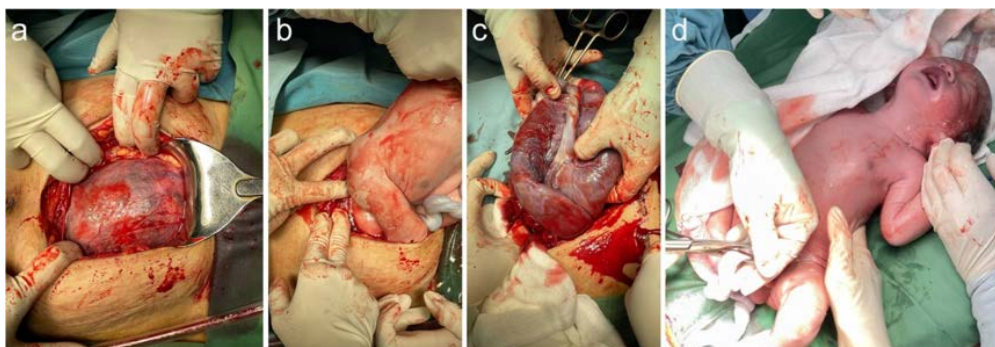


Figure 3: Delivery via caesarean section.

- (a) Following dissection of the abdominal wall, a bulging uterus is visible.
- (b) The uterine cavity is entered, and the newborn is delivered.
- (c) The placenta is subsequently delivered from the uterine cavity.
- (d) The newborn was delivered alive with vigorous crying and a good Apgar score.

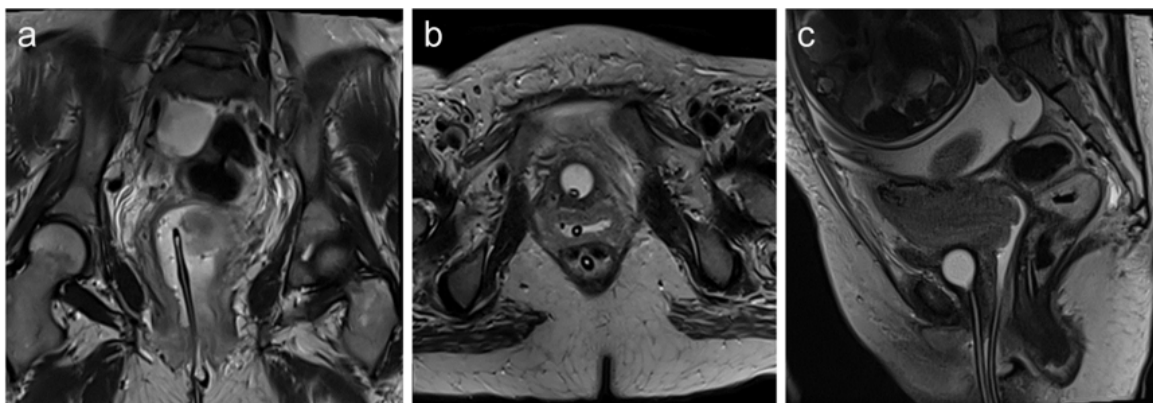


Figure 4: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI). The same catheterization technique was employed, which involved the insertion of catheters into the bladder, vagina, and rectum. The uterus had one normal cervical lumen and vagina.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view

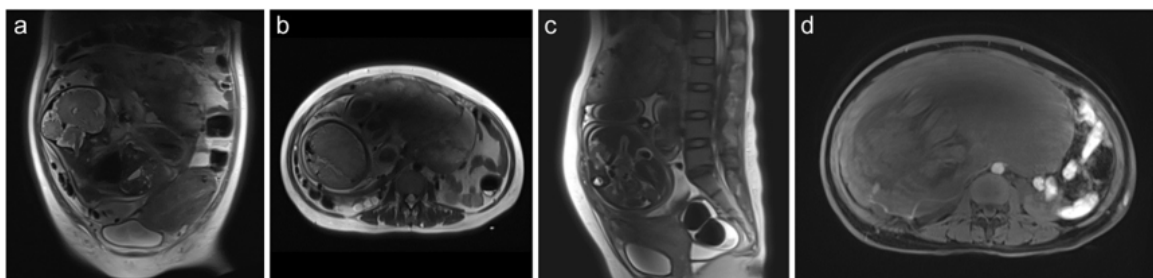


Figure 5: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI). An ectopic pregnancy was seen with a gestational on the right side of the uterus, surrounded by a thin pseudomembrane, containing a singleton fetus appearing aterm in amniotic fluid, with the placenta located superior to the fetus.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view
- (d) Axial view



Figure 6: A laparotomy was performed for fetal evacuation, revealing aterm fetus enveloped in amniotic fluid. Following the exteriorization of the uterus and placenta, it was observed that the intestines were adherent to the posterior side of the placenta. It was decided to leave a portion of the placenta.

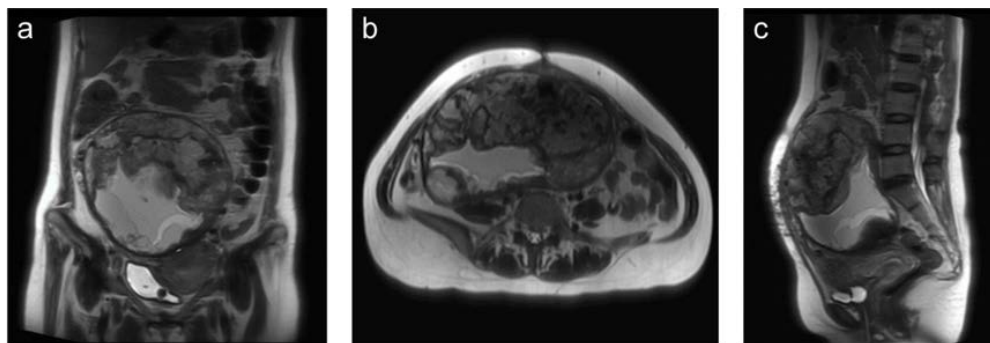


Figure 7: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI). MRI examination at 41 days post-operatively.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view.



Figure 8: USG performed 65 days post-operatively.

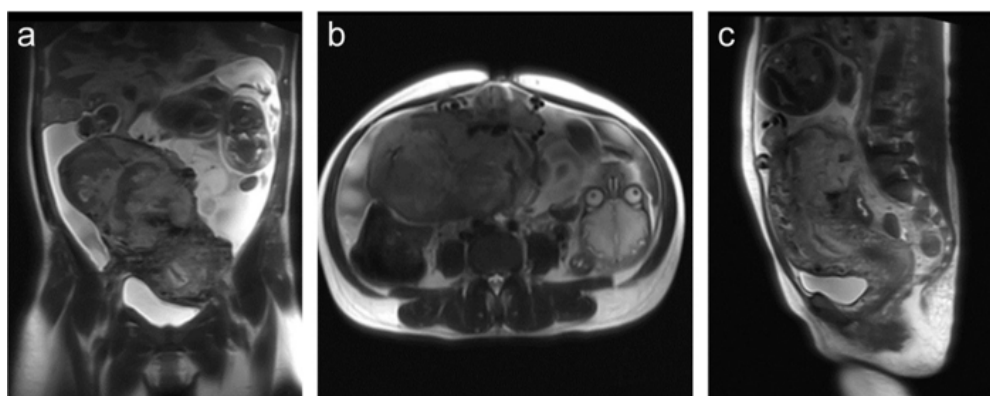


Figure 9: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI) reveals a fetus located outside the uterus, with a very thin gestational sac wall. Additionally, placental implantation is observed at the uterine fundus, resulting in a defect and bulging that extends from the uterine cavity into the abdominal cavity.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view.



Figure 10: During laparotomy, a fetus with low birth weight was identified, and the presence of a fundal uterine implantation by the placenta was observed.

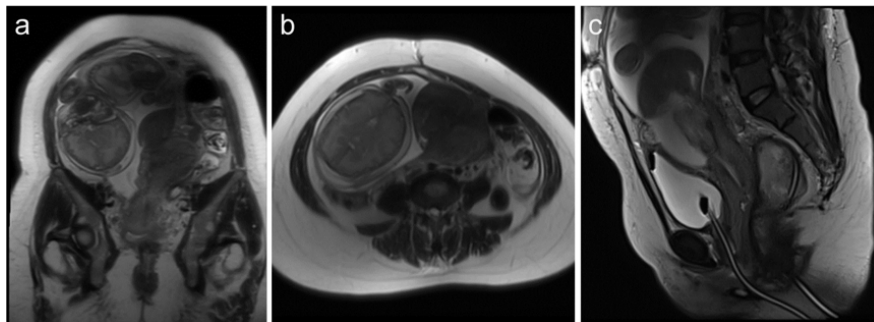


Figure 11: Magnetic resonance imaging (MRI) 3 Tesla, T2-weighted sequences (T2WI). The placenta was detached from the uterine cavity at the site of the defect, with the placental surface appearing smooth and without adhesion to surrounding organs. There was no visible umbilical cord connecting to the fetal abdomen.

- (a) Coronal view
- (b) Axial view
- (c) Sagittal view.

KEYWORDS

Abdominal; Laparotomy; Magnetic Resonance Imaging; Pregnancy; Uterus;

ABBREVIATIONS

BPD = Biparietal Diameter
D&C = Dilation and Curettage
DIC = Disseminated Intravascular Coagulation
IUGR = Intrauterine Growth Restriction
MRI = Magnetic Resonance Imaging
OFD = Occipitofrontal Diameter
POD = Pouch Of Douglas
USG = Ultrasonography
 β -hCG = Beta-Human Chorionic Gonadotropin

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