Case Report

A Case Report: MRI versus Ultrasonography in Abdominal Pregnancy, Which One is Better?

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Abstract
Abdominal pregnancy is a rare potentially life-threatening form of ectopic pregnancy. First trimester sonography is very useful to identify an abdominal pregnancy earlier. However, cases of undiagnosed abdominal pregnancy at second and third trimesters are still reported in obstetric practice. Abdominal pregnancy is often missed during routine ultrasound examination that has classical findings such as the absence of myometrial tissue between the maternal bladder and the pregnancy, an empty uterus, poor visualization of the placenta, oligohydramnios, and abnormality of fetal lie. Magnetic Resonance Imaging (MRI) has been reported as the best abdominal pregnancy detection modality in a later gestational age due to its ability in detailing vascular and placental organ invasion.
The reporting of a case of a patient with an abdominal pregnancy involves a diagnosis using abdominal ultrasound in the second trimester. A 38-year-old woman was admitted to RSUP Dr. Hasan Sadikin Bandung with suspected abdominal pregnancy at gestational age of 28 weeks. Due to unclear clinical manifestation, the diagnosis of abdominal pregnancy was not detected and there was a plan for vaginal termination of pregnancy by misoprostol induction in the hospital before. The patient complained about progressive abdominal pain and difficult of defecation for 2 months before and this condition worsened in the last 4 days. Ultrasound examination in RSHS revealed that there were one living fetus, extra-uterine pregnancy with estimated fetal weight of 664 grams, fetal heart rate (+), and transverse breech presentation. Congenital abnormality was difficult to assess due to oligohydramnios. MRI was performed and showed intra-abdomen pregnancy with one living fetus, breech presentation, and intact amniotic membrane with oligohydramnios which was superior to the uterus and attached along the anterior aspect of uterus. The placenta had the size os 11.52 x 7.02 x 13.07 cm, was diffusely heterogenous in shape, on the right superoanterolateral wall of the gestational sac, and seemed to be attached to the right anterior abdominal wall and part of the intestine in the superior part while no placental adherence was seen. The patient was successfully treated with exploratory laparotomy with complete removal of the fetus and placenta.
This case was reported to compare the advantage of MRI and ultrasound examination in detecting abdominal pregnancy, especially in late gestational age.

Key words: ultrasound, MRI, abdominal pregnancy

Laporan Kasus: MRI dan Ultrasonografi pada Kehamilan Abdomen, Manakah yang Lebih Baik?

Abstrak
Kehamilan abdomen adalah bentuk kehamilan ektopik yang jarang terjadi dan memiliki potensi mengancam jiwa. Pemeriksaan ultrasonografi (USG) pada trimester pertama berguna untuk mengidentifikasi kehamilan abdominal lebih awal. Namun, kehamilan abdomen yang tidak terdiagnosis masih sering dijumpai pada trimester kedua dan ketiga. Tanda klasik kehamilan abdomen sering terlewatkan oleh operator pada saat pemeriksaan USG rutin. Magnetic Resonance Imaging (MRI) merupakan modalitas terbaik untuk mendeteksi kehamilan abdomen pada usia kehamilan yang lebih tua karena mampu melihat invasi pembuluh darah dan organ plasenta secara lebih detail. Kami melaporkan sebuah kasus mengenai seorang wanita 38 tahun yang terdeteksi memiliki kehamilan abdominal pada usia kehamilan 28 minggu pada pemeriksaan USG saat perawatan di RSHS. Manifestasi klinis pada pasien tidak spesifik sehingga diagnosis kehamilan abdominal terlewati dan sempat diberikan rencana terminasi kehamilan pervaginam di rumah sakit sebelumnya. Pemeriksaan USG menunjukkan terdapat satu janin hidup dan terletak luar rahim. Kemudian pasien diputuskan menjalani pemeriksaan MRI, ditemukan adanya kehamilan intra abdomen dengan satu janin hidup, presentasi bokong, dan plasenta berbentuk heterogen difus, di dinding superoanterolateral kanan kantung kehamilan, melekat pada dinding abdomen anterior kanan dan bagian usus di bagian superior, dan tanpa adanya perlengketan plasenta. Pasien ditangani dengan laparotomi eksplorasi dengan pengangkatan janin dan plasenta secara lengkap.
Kasus ini bertujuan membandingkan keunggulan pemeriksaan MRI dan USG dalam mendeteksi kehamilan abdominal, terutama pada usia kehamilan lanjut.

Kata kunci: ultrasonografi, MRI, kehamilan abdominal

Background

The incidence of abdominal pregnancy is 1% of all ectopic pregnancies, making it a potentially life-threatening form of ectopic gestation. Rarely does it reach advanced gestation and a living fetus is uncommon. Most pregnancies are terminated early due to a poor prognosis for the fetus and an increased risk of maternal mortality due to hemorrhagic shock following spontaneous placental separation. A vital index of suspicion is necessary for the accurate diagnosis of abdominal pregnancy and its prompt care.

This is a case report of abdominal pregnancy with the diagnosis based on thorough gynaecological, abdominal ultrasound, and MRI exams.

Case Presentation

A 38-year-old woman gravida III para II abortus 0 with gestational age of 28-29 weeks came to a primary healthcare with chief complaints of defecating difficulty since past months and the condition got worse in last 4 days. Complaints of contraction that got more frequent and stronger were denied. Complaints of lots of fluids from the birth canal was denied. Fetal movements were still felt. History of chronic diseases was denied. Prior to this, the patient underwent an ultrasound examination at 3 months of gestation and was diagnosed with a suspected congenital defect; she was advised to refer to RSUD Cililin. Ultrasound examination revealed oligohydramnios, suspected congenital anomalies, and IUGR, then there was a plan to terminate the pregnancy. Four doses of misoprostol were administered vaginally, but there was no progression of labor. The patient was referred to RSHS after a re-evaluation of ultrasound that revealed abdominal pregnancy.

The clinical investigation revealed that vital signs were within normal limit. Fundal height was equivalent to the umbilicus, there was no uterine contraction, and fetal heart rate of 152 up to 156 beats per minute was discovered during an abdominal examination. The internal examination revealed that there was no cervical dilatation and that Douglas's pouch was enlarged. Blood laboratory tests were carried out, showing hemoglobin of 10.5 g/dL, hematocrit of 30.6%, leucocyte of $16.96x10^3$/uL, and platelet count of 255 thousand/uL. Ultrasound examination (Figure 1) was performed at RSHS, showing that the adnexa was difficult to assess with estimated fetal weight of 664 grams, the fetal heartrate was shown, and congenital abnormality was difficult to assess because of the oligohydramnios. Extrauterine pregnancy with transverse breech presentation was located in the Douglas's pouch with the placenta implanted on the right lateral side of the patient. It expanded to the Douglas's pouch, measuring 7.70 cm, 5.42 cm, and 5.11 cm.

Since there were doubts about the sonogram results, we suggested and explained to the patient that she must have an MRI examination before she underwent surgery, and later she agreed. MRI (Figure 2) was performed, which revealed an intraabdominal extrauterine pregnancy with one living fetus in breech position in the intact amniotic cavity with minimal amniotic fluid volume, superior to the uterus, attached along the anterior aspect of the uterus, and dislodging the uterus inferiorly with minimal intra-amniotic hematoma. Placenta measuring 11.52 x 7.02 x 13.07 cm was diffusely heterogeneous in shape and was located on the right supero-anterolateral wall of the gestational sac. It appeared to be attached to the right anterior abdominal wall and a portion of the intestine in the superior portion, but no placental adherence was observed. The uterus looked enlarged with a retroflexion position and a thickened endometrial line while the uterine cavity was empty. Multilocular cystic mass

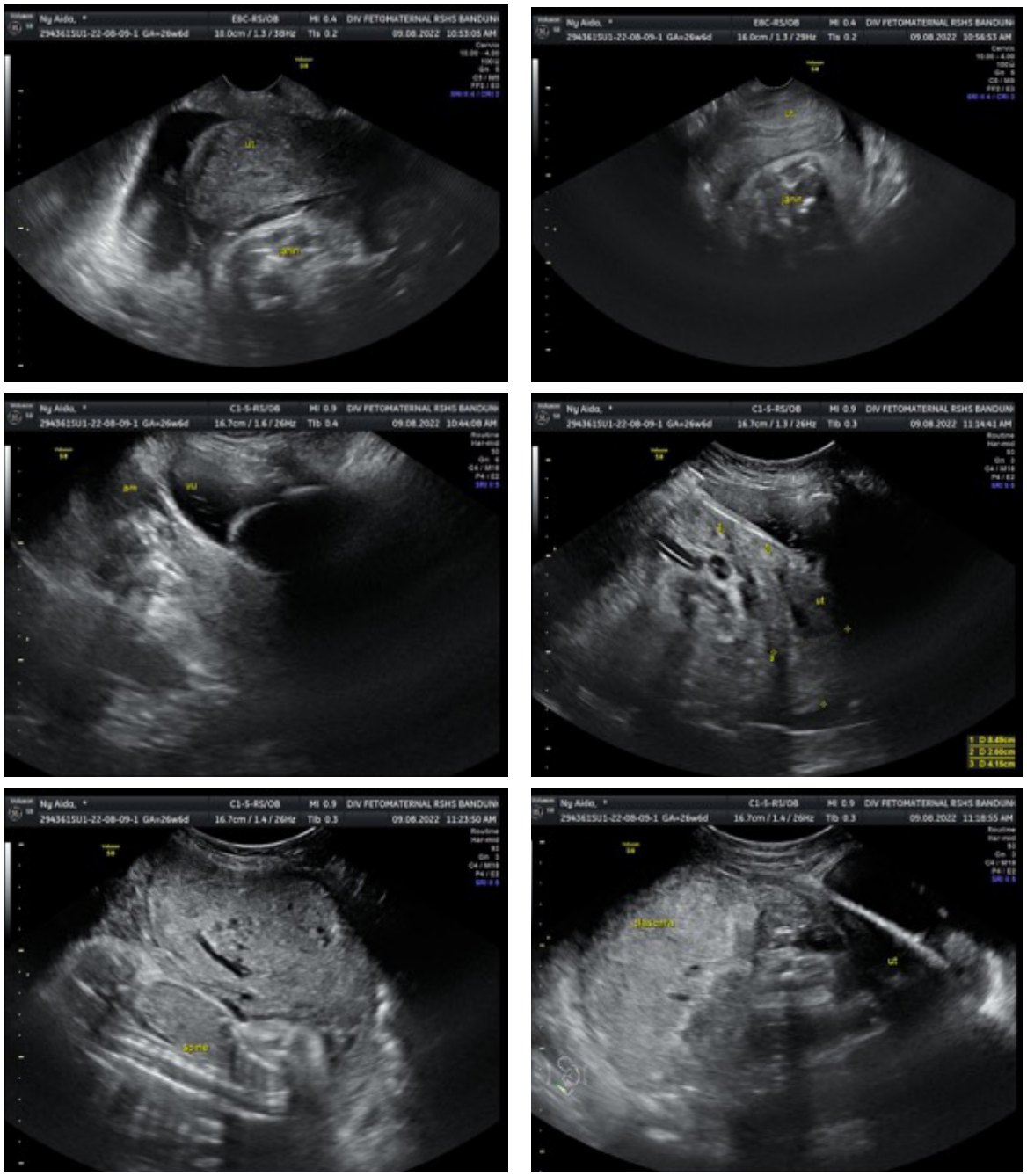

Figure 1 Fetomaternal Ultrasound Gestational Component Found Outside of the Uterus

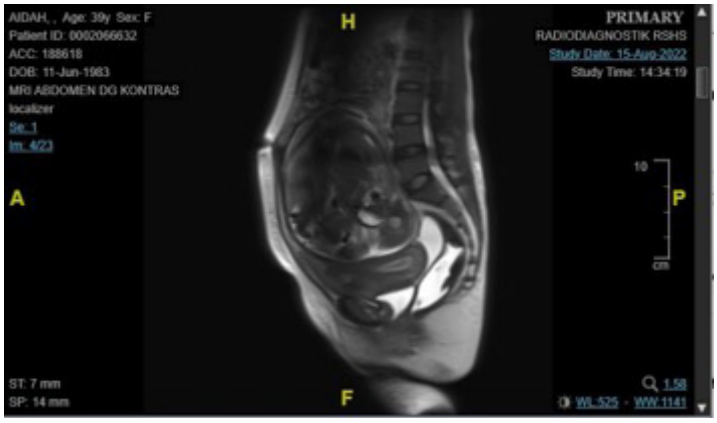

Figure 2 Magnetic resonance imaging slice

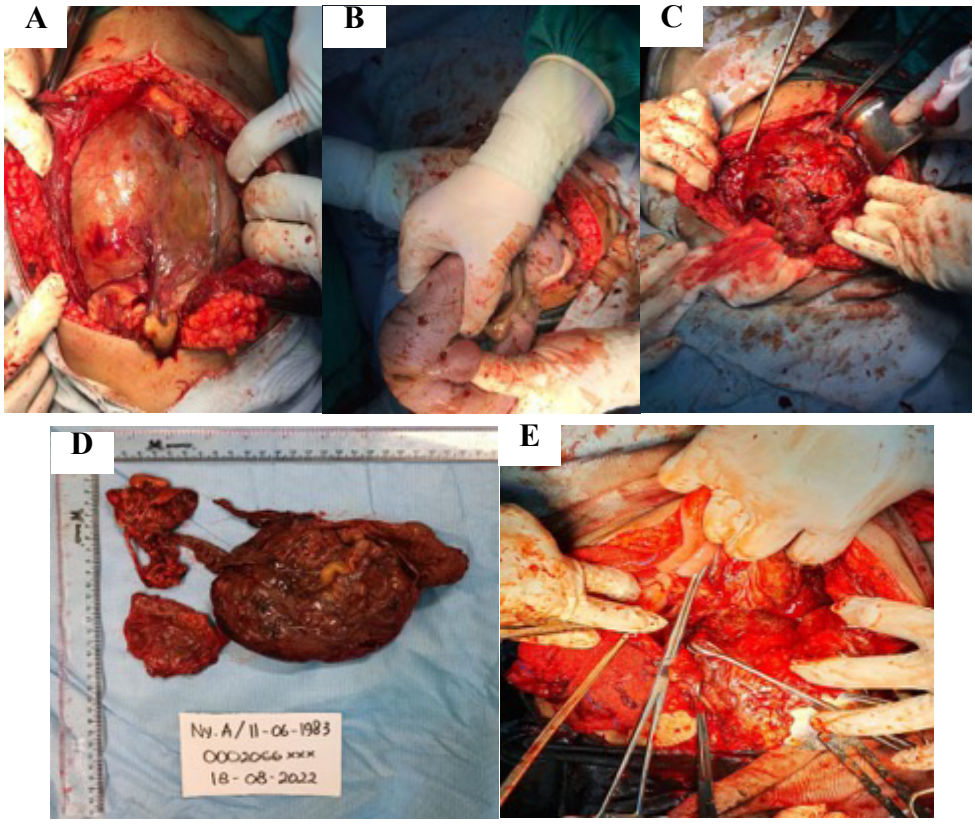

Figure 3 Performed Exploratory Laparotomy And Adhesiolysis

with incomplete tortuous septa was located in the left adnexa region, exhibiting a change in signal intensity, hypointense on T1WI and hyperintense on T2WI; post-contrast imaging did not reveal enhancement at the edges. The suspect left hydrosalpinx (ORADS 2/Almost Certain to Be Benign).

Exploratory laparotomy (Figure 3) was performed. After the peritoneum was opened, a flat, blue-green cystic mass with adhesions to half of the omentum covering the mass was observed and adhesiolysis was performed. Exploration revealed that the anterior portion of the mass adhered to the urinary bladder, while the posterior portion adhered to the rectal colon and a portion of the right pelvic wall. Fetus was discovered in the amniotic membrane; amniotomy was performed; approximately ±100 cc of reddish-brown, viscous fluid was expelled, then a baby boy was born with leg extraction. His weight was 1,200 grams, APGAR scores were 1' = 4, 5' = 6, 10' = 7. The placenta was discovered in Douglas's pouch on the patient's right side. The uterus appeared to be identified in the fundus, the two adnexa were difficult to identify, and the posterior portion of the uterus was attached to the placenta, so adhesiolysis was performed. The posterior portion of the placenta revealed adhesions with the rectal colon and the right lateral pelvic wall. It was decided to release the placenta through intestinal surgery and insert a rectal catheter as a marker.

Discussion

Ectopic pregnancy occurs whenever the fetus develops outside of the uterine cavity, with the fallopian tube being the most common place (almost 90%). Implantation is also possible in the abdomen, cervix, ovary, and caesarean scar. Women exhibiting clinical signs and physical symptoms of a ruptured ectopic pregnancy, such as hemodynamic instability or acute abdominal pain, should be checked and treated immediately. A strong index of suspicion facilitates early diagnosis.[1] Patients with stable clinical conditions can undergo transabdominal (TA) and endovaginal (EV) ultrasonography.[2] The presence of an intrauterine gestational sac effectively rules out the presence of an ectopic pregnancy. As part of a heterotopic pregnancy, the possibility of an ectopic pregnancy should be investigated.

USG

Ultrasonography of the TA and EV is indicated in all studies. A full bladder should be an appropriate TA ultrasonography window in a stable patient. In unstable patients who require a prompt diagnosis, the delay in bladder filling time may be problematic. With an empty bladder, TA or EV ultrasonography may be conducted on these patients.[3, 4, 5] TA and EV examinations should continue to be administered with an understanding of the limited but significant components of the TA portion. TA examination permits a more accurate evaluation of the superior uterus and adnexa. It may aid in discovering free peritoneal fluid and/or bleeding beyond the dead end.[6]

The transvaginal examination gives a comprehensive evaluation of the uterine cavity and ovaries. However, the high-frequency transducer that enables more excellent near-field resolution compared to transabdominal tests has limited good penetration (far-field imaging). Imaging is frequently related to medical management.[7] Further ultrasonography and beta-HCG values may be beneficial if the diagnosis is ambiguous.[8] A typical intrauterine pregnancy should exhibit a beta-HCG doubling time of 48 hours. False-positive ultrasonographic results may be attributable to a missed abortion or even an early normal intrauterine pregnancy (4.5 weeks) with or without secondary adnexal mass findings. The latter scenario

may feature an intrauterine pregnancy with a hemorrhagic corpus luteum cyst or an intrauterine pregnancy with an adnexal mass, as seen in appendicitis. False-negative results could result from an intrauterine decidual response pseudo sac that mimics an early intrauterine pregnancy. On retroactive evaluation, around 8% of confirmed ectopic pregnancies are normal by USG examination. Concurrent intrauterine and ectopic pregnancy (especially in infertile patients) are additional reasons for false-negative ectopic pregnancy results. A fundamental cause of inaccuracy in emergency ultrasonography is the operator's technical expertise: a correct ultrasonographic examination is directly proportional to the operator's skill, training, and experience. The responsibilities of the sonographer include maximizing the diagnostic potential of ultrasonography, knowing what to look for, and having the ability to interpret ultrasonographic data based on an awareness of the physiology and pathological alterations of the investigated organs.[9]

MRI

The Magnetic Resonance Imaging (MRI) technique has been utilized as a problem-solving tool in patients with stable conditions and particular circumstances.[10] MRI examinations are both time-consuming and costly. When a patient's condition is stable, MRI should only be used to solve problems. This imaging modality provides precise tissue characterization, blood product detection, and age determination. Early intrauterine pregnancy or a missed abortion may be associated with normal MRI findings, resulting in a false diagnosis of ectopic pregnancy.[11]

For pregnant patients, USG is the pelvic/abdominal imaging modality of choice. It does not require potentially harmful ionizing radiation, is easily accessible, and enables real-time imaging. If Ultrasonography (US) is unable to pinpoint the position of a pregnancy, Magnetic Resonance Imaging (MRI) can be helpful.[12] Examples include distinguishing an intrauterine pregnancy from a cervical or interstitial pregnancy when vision is hampered by fibroids, the patient's body habitus, or in individuals with abdominal pregnancies or uterine duplication anomalies. MRI's performance can be superior to USG because it delivers good soft tissue contrast in many planes and a more extensive field of view. Given that organogenesis occurs in the first trimester, the use of MRI in the first trimester should be restricted to situations in which USG cannot provide the necessary information, when the results of MRI will change the patient's care, and when the patient's condition is acute and prevents observation. No gadolinium-based contrast agents are used during the procedure.[13]

USG VS MRI

Comparative study to help detection of specific diagnosis between ultrasound and MRI was performed. Barzilay et al. stated that USG was superior to MRI in detection of placenta accreta spectrum.[14] Another study also stated that USG could be used as a first screening tool in ovarian pain and evaluation of adnexal mass lesion due to the convenience and absence of radiation. However, MRI has more specificity and accuracy that can provide better imaging data for clinical diagnosis and treatment if USG results are unspecific.[15, 16] This could be due to the fact that MRI delivers good soft tissue contrast in many planes and a more extensive field of view. MRI performance can be greatly improved as a diagnostic tool with the use of a structured scoring system and cumulative experience. [14, 17]

Conclusion

Due to the displacement of surrounding structures by the pregnant uterus, sonography remains first-line, but anatomical visibility may be limited. Abdominal and pelvic soft-tissue cross-sectional evaluation by MRI is excellent. However, MRI examinations are more time-consuming and expensive than sonography, and ultrasonographic examinations are strongly related to the operator's skill, training, and experience, making this test highly operator-dependent. In this instance, however, the diagnostic results of the ultrasound and MRI scans were identical.

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