A viable secondary intra-abdominal pregnancy resulting from rupture of uterine scar: role of MRI

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ABSTRACT. Pre-natal diagnosis of intra-abdominal pregnancy is difficult. Ultrasound has been the frontline modality to date; however, it gives a diagnostic error of 50–90% and its use is disappointing. In recent years, MRI has emerged as an appealing imaging modality. With its good soft tissue contrast and non-ionizing property, it acts as a means of definitive non-invasive assessment before surgical intervention when ultrasound is inconclusive.

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Rupture of uterine scars during labour is well documented. However, early rupture of a uterine scar in a gravid uterus is rare. From 1966 to 1999, only seven cases have been reported in the literature, in which all ruptured before 15 weeks of amenorrhoea [1]. There were no reports on early scar rupture with a viable intra-abdominal pregnancy which proceeded to term. We report a patient with an undetected scar rupture and a viable growing extrauterine intra-abdominal pregnancy which was only detected at 32 weeks of gestation. Early ultrasound missed the diagnosis and it was only confirmed later on MRI.

Case report

A 34-year-old gravida 5 para 2 + 2 was referred to our centre at 29 weeks of amenorrhoea from a private hospital with suspected abruptio placentae. Obstetric ultrasound showed placenta praevia major with no evidence of retroplacental clot.

She had two previous lower segment caesarean sections (LSCS), the first in 1999 for breech presentation and the second in 2002 on maternal request.

On the second day of admission, the patient complained of severe epigastric pain radiating to the back. Serum amylase was slightly raised, measuring 202 IU l⁻¹ and her urine amylase level was high, measuring 1160 IU l⁻¹. A working diagnosis of acute pancreatitis was made.

An echocardiogram revealed a mild increase in pulmonary artery pressure, raising the possibility of pulmonary embolism; therefore, an urgent CT scan of the thorax and abdomen was performed on the same day using a Light Speed 16 slice CT scanner (GE Medical Systems, Milwaukee, WI) which showed no evidence of pulmonary embolism, but there were bilateral pleural effusions with adjacent collapse consolidation consistent with infection. The CT of the abdomen revealed a normal pancreas, but discovered that the fetus was not surrounded by a definite uterine wall. An extrauterine pregnancy was therefore suspected.

An obstetric ultrasound showed an intrauterine pregnancy with a huge placenta extending from the fundus to the lower segment closing the os. The placenta was seen to invade all round the lower uterine wall and also into the cervix as well as the scar. In view of the high index of suspicion of an extrauterine pregnancy based on the CT scan, an MRI of the abdomen and pelvis was performed using MRI Magnetom Vision 1.5 Tesla (Siemens, Erlangen, Germany). Sequence protocols included True FISP (fast imaging with steady state precession) for all three planes: axial, coronal and sagittal as well as sagittal short tau inversion recovery (STIR). The True FISP sequence is an ultrafast sequence with short repetition time (TR) and echo time (TE) of 6.3 s and 3.0 s, respectively. Total time of acquisition was less than 20 s, thus it can be carried out in a single breath hold. It confirmed the findings of extrauterine pregnancy with the fetus extruding through the scar and into the abdominal cavity (Figures 1 and 2). A diagnosis of uterine rupture with the fetus extruded into the abdominal cavity was made.

A laparotomy with caesarean hysterectomy and repair of bladder perforation were performed the following day. The finding of an intra-abdominal fetus which was not covered by an amniotic sac was made. Her placenta was tightly stuck to the margin of the uterine perforation, giving the clinical diagnosis of placenta percreta (Figure 3).
She delivered a healthy baby girl weighing 2.02 kg. The pathological interpretation of the uterus and placenta was consistent with a gravid uterus with placenta percreta. Patient was discharged well on day 10 post-operatively with continuous bladder drainage. Cystogram performed as an outpatient 2 weeks later revealed a vesico-vaginal fistula. The patient was kept on continuous bladder drainage. Her baby was thriving and well.

**Discussion**

Our case illustrates a secondary intra-abdominal pregnancy resulting from an undetected scar rupture. This patient had two previous caesarean sections which were carried out at a private hospital. We could not obtain any information about the two previous operations, e.g. whether they were complicated by uterine tear or not. The scar rupture was not detected earlier due to the low level of suspicion. Fortunately, the presence of placenta percreta in this case had indirectly saved the lives of both mother and baby. The placenta invaded the uterine muscle and parasitized the blood supply from the uterus. Furthermore, it was firmly stuck to the uterus, making it less likely to separate, and thus preventing a catastrophic haemorrhage.

Overt scar rupture is a devastating, serious and tragic obstetric emergency. In our literature review, from 12 cases of uterine rupture, 11 are from previous scars and 4 of the 11 cases are silent rupture prior to labour [2]. These silent scar ruptures are insidious in onset and development. Therefore, the diagnosis is often not considered, especially if it occurs before the onset of labour, as in this case.

Early diagnosis of intra-abdominal pregnancy is important to plan delivery and achieve good results. If undiagnosed, it carries the risk of haemorrhage secondary to placenta separation, hypofibrinogenenaemia following fetal demise and abscess formation. The diagnostic
error for the last 40 years has been reported to be approximately 40–90% [3].

Ultrasound, which is well recognized as the primary imaging technique in obstetrics, has been shown to miss the diagnosis of intra-abdominal pregnancy in 50% of cases [3]. Features on ultrasound are abnormal relationships between the fetus, uterus, placenta and amniotic fluid. Unusual fetal lie, which is commonly transverse, oligohydramnios and fetal congenital malformation should increase the suspicion. Also, the presence of maternal peritoneal fluid in normal pregnancy is unusual [4].

Our patient had undergone ultrasound studies which were indeterminate and inconclusive. The diagnosis of extraterine pregnancy was only suspected later following a CT scan which does not give as good soft tissue contrast as MRI. Thus, a decision was made to proceed with MRI examination to confirm this diagnosis.

MRI is a new and safe imaging method giving multiplanar images with no ionizing radiation. The main sequence protocol in this case is True FISP sequence, which is an ultrafast coherent gradient echo sequence. It gives a very fast scan, thus breath hold is possible. Furthermore, its fast imaging has helped to almost nullify the problem of fetal motion, thus also the need for maternal sedation. Motion artefact can also be eliminated by suspension of maternal breath. A True FISP sequence offers good soft tissue contrast and the image quality is considered to be far better compared with other ultrafast sequences such as half-Fourier acquired single-shot turbo spin echo (HASTE). The high resolution images also offer excellent fetal tissue contrast without the need for fetal sedation, thus playing an important role in fetal MRI [5].

MRI has several advantages such as no interference by skeletal, fat and gas filled maternal structure, thus giving better fetal detail. There is clinical and laboratory evidence to suggest that MRI is safe to use in obstetric cases with no effect on fetal heart rate and Doppler flow [6]. However, it is nevertheless prudent at the present time to avoid exposure during the period of most rapid organogenesis. It is justified to use MRI to prevent possible obstetric disaster.

Features of intra-abdominal pregnancy on MRI are the absence of uterine wall between the fetus and maternal abdominal wall, unusual fetal position, normally transverse, extraterine fetus and placenta, oligohydramnios, enlarged uterus and close relationship between placenta and maternal bowel [3]. The information on the location, blood supply and state of viability of the placenta will influence management and aid in planning surgery. As ultrasound diagnosis was equivocal and inconclusive in this case, MRI is useful to confirm the diagnosis and show the extent of peritoneal or mesenteric involvement for pre-operative planning. The site of scar rupture with the attached placenta and the umbilical cord were also shown clearly on MRI. The fetal anatomy was well demonstrated and was shown to be grossly normal.

Due to the high fetal and maternal morbidity and mortality in intra-abdominal pregnancy with high risk of placenta separation and increased incidence of congenital malformation, it has been common practice to terminate the pregnancy as soon as possible after diagnosis [7]. However, there is controversy regarding the optimal time to operate. For early diagnosis of intra-abdominal pregnancy, which is less than 24 weeks of gestation, early laparatomy is recommended. In rare cases with a fetus near viability, it is justified to postpone the operation in view of saving a baby [8]. The patient and fetus are closely followed up to allow further fetal development. Our patient presented at 32 weeks of gestation. As the risk of prematurity is outweighed by the high risk of maternal morbidity, the decision was made to deliver the baby.

The presence of placenta percreta in our patient left our obstetrician with no other choice but to proceed with a hysterectomy together with removal of the placenta.

Conclusion

Advanced intra-abdominal pregnancy is rare and the documentation of a viable full term fetus is exceptional. MRI is a new technique in obstetrics, and rapid advances are likely in the next few years. It is certain to be one of the most exciting research tools in the next decade and likely to be of great clinical usefulness. This case suggests that MRI is useful in suspected cases of abdominal pregnancy by confirming the exact relationships between the uterus, placenta and the fetus.

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References