

Case Report

“Showercap” Sign: Spontaneous Uterine Rupture in a Primiparous Woman

Emily Aherne¹, Katie Beauchamp², Niamh Maher², Thomas Walsh², William Boyd², Maeve Eogan³, Leo Lawler¹

Accepted: 22nd January 2017

Provenance: externally peer-reviewed.

Keywords: Uterine Rupture, MRI, Obstetric imaging, Pregnancy, Acute abdomen, Emergency imaging

ABSTRACT

A 32-year-old primiparous woman presented with severe abdominal pain at 21 weeks' gestation. Background history of laparoscopy for chronic pelvic pain and a spontaneous miscarriage was noted. On examination, she was peritonitic and tachycardic with low grade fever and anemia. MRI abdomen demonstrated a uterine rupture with a large cap of clotted blood overlying the uterine fundus with the appearance of a “shower cap” and large volume haemoperitoneum, the presumptive diagnosis was uterine rupture with placental extrusion. Emergency laparotomy confirmed a two litre haemoperitoneum due to a 3cm defect at the uterine fundus through which a portion of placenta and membrane were extruding. Hysterotomy and delivery of the non-viable fetus was performed. The defect was repaired. It is important to remember that there are many causes of acute abdominal pain in pregnant patients, obstetric and other. Uterine rupture is a rare but life-threatening cause. An underlying risk factor is usually identified.

INTRODUCTION

Uterine rupture is a serious obstetric complication with high risk of foeto-maternal morbidity and mortality. It is defined as separation of the entire thickness of the uterine wall with extrusion of fetal parts and intra-amniotic contents into the peritoneal cavity¹. This rare complication has an incidence of <1% in women with scarred uteri, however it is extremely rare in the unscarred uterus with a suggested incidence of only 0.006%^{2, 3}. Non-contrast MRI is being increasingly used in pregnant patients in the emergency setting for rapid and accurate identification of aetiology of abdominal pain⁴. Our case is of a 32-year-old primiparous patient, 21 weeks gestation with severe abdominal pain without any clearly defined risk factors for rupture on initial enquiry.

CASE REPORT

At 21 weeks gestation, our patient, gravida 2 para 0, presented to her maternity unit with a two hour history of sudden onset severe abdominal pain and two episodes of diarrhoea. No vaginal bleeding was noted. Background history included a

spontaneous complete miscarriage 5 months previously. Past medical history included a diagnostic laparoscopy for chronic pelvic pain, peptic ulcer disease, and depression.

Maternal observations were notable for intermittent tachycardia, a brief hypotensive episode, responsive to fluids and a temperature spike to 38.1°C. Haemoglobin at presentation was 11.6 g/dL. Fetal assessment ultrasound was unremarkable, the fetal heartbeat was present. There was a clinical suspicion of appendicitis. Septic screen was performed and empiric antibiotics were given before transfer to tertiary general hospital for general surgical review.

On examination, her abdomen was tender, with rebound and signs of peritonitis. The haemoglobin had been slowly trending downwards from initial 11.6g/dl to 8.9g/dl.

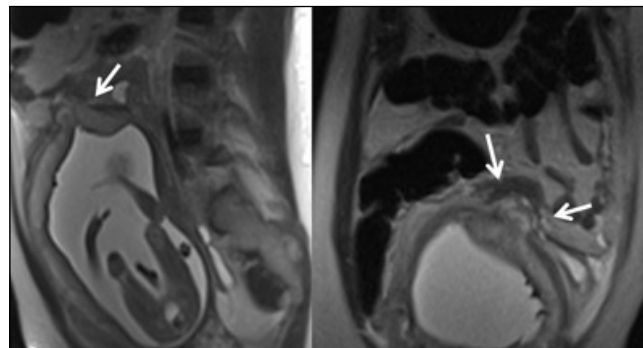


Fig 1. T2 weighted sagittal and coronal images of the defect at the fundus of the uterus with placental extrusion (white arrows).

Initial transabdominal ultrasound was non-specific, demonstrating a small volume of free fluid in the pelvis. The patient was transferred directly for multiplanar, rapid sequence T2 weighted MRI abdomen which identified a fundal uterine defect (Fig 1) with a large cap of material overlying the uterine fundus. This gave the appearance of

1. Department of Radiology, Mater Misericordiae University Hospital, Eccles St., Dublin 7, Ireland.
2. Department of Gynaecology, Mater Misericordiae University Hospital, Eccles St., Dublin 7, Ireland.
3. Department of Obstetrics & Gynaecology, Rotunda Hospital, Dublin 1, Ireland.

Corresponding author: Emily Aherne

Emily.aherne@gmail.com

a “shower cap” and was thought to represent clotted blood or extensive placental extrusion or percreta (Fig 2). The appendix was unremarkable.

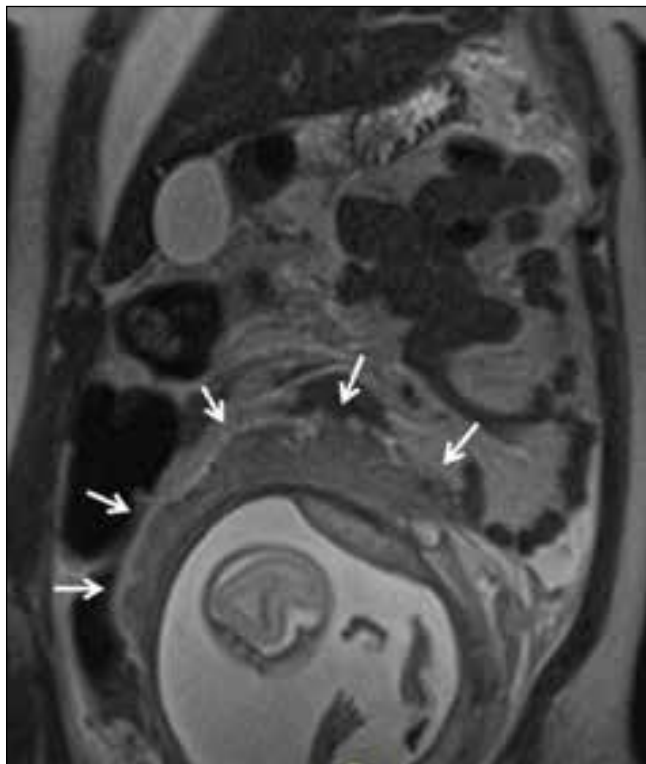


Fig 2. T2 weighted coronal image illustrating the “showercap” sign of clotted blood products overlying the point of uterine rupture (white arrows).

An emergency laparotomy was performed. The MRI findings clearly correlated with 3cm defect at the uterine fundus through which a portion of placenta and membrane were extruding (Fig 3), and large volume haemoperitoneum with a cap of clotted blood over the uterus corresponding to the “shower cap” sign seen on MRI. Hysterotomy via a linear extension of the uterine defect was performed, the non-viable fetus was delivered and the uterus was repaired. The course of her physical recovery as an inpatient was uncomplicated. It emerged on retrospective review that there had been inadvertent uterine rupture at the time of prior laparoscopy for chronic pelvic pain, this had not previously been disclosed to the patient.

DISCUSSION

Uterine rupture is rarely seen in modern radiology practice. The majority of uterine ruptures occur intrapartum in the third trimester. It classically presents when a previously scarred uterus (most commonly caesarean section) is further stressed by labour, and patients are transferred directly to the operating room without preoperative imaging.

Other predisposing factors include induction of labour or oxytocin augmentation, uterine anomalies, grand multiparity among others. Third trimester uterine rupture classically involves the lower segment, regardless of whether the uterus is scarred or not. First and second trimester ruptures

occur typically at the fundus. Nulliparous women have been described as “virtually immune to rupture”, especially before the onset of contractions⁵. This case was especially confounding as it occurred in the second trimester, in a primiparous patient, with no apparent uterine scar or anomalies, although this was later found not to be the case.

Magnetic resonance imaging (MRI) is commonly used for the assessment of the acute abdomen in pregnant women as a second line imaging modality after ultrasound^{6,7}. In our institution, we use a rapid sequence multiplanar T2 weighted protocol, imaging in the axial, coronal and sagittal planes. The protocol takes approximately 15 minutes to complete.

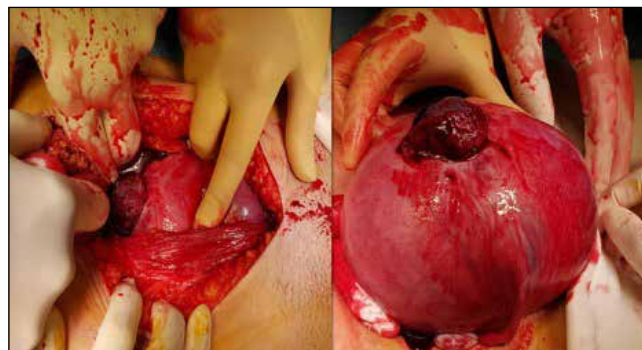


Fig 3. Corresponding intraoperative images of the defect at the fundus of the uterus with placental extrusion.

Appendicitis often needs to be excluded and MRI has been proven to be accurate in the diagnosis of appendicitis⁸, while also giving information regarding other relevant structures such as the kidneys, bowel, gallbladder and pelvic organs. MRI is not routinely used for imaging abdominal emergencies as it is less available out of hours and imaging can take considerably longer than an equivalent CT study. However, during pregnancy, the gravid uterus causes anatomical distortion of the abdomen and pelvis which decreases the sensitivity of ultrasound.

The absence of ionising radiation renders MRI relatively safe in pregnancy. There are some concerns of the heating effect on the placenta during prolonged image acquisition^{9,10} so rapid sequence multiplanar T2 sequences with high soft tissue resolution are acquired and the patient is removed from the magnetic field as quickly as possible⁹. Rapid sequence acquisition also minimizes any delay in diagnosis and treatment - hugely advantageous in the setting of an acute abdomen. Despite concerns, there has been no documented teratogenic effect. Gadolinium based contrast agents cross the placenta and hence its administration is not recommended in pregnant patients unless the benefit outweighs the risk.

A gravid young woman in a hyperdynamic circulatory state can lose 2.5L of her circulating volume before becoming symptomatic. The importance of a thorough history and attention to the physical examination cannot be overemphasised. The initial differential diagnosis in a pregnant woman with abdominal pain always includes the most obvious obstetric causes: constipation, urinary tract infections, uterine contractions, musculoskeletal pain, and,



less commonly, placental abruption, as well as non-obstetric causes including cholecystitis and appendicitis. On MRI, the diagnosis of uterine rupture became readily apparent and the appearance clearly correlated with the intraoperative findings, without delaying intervention. We wish to describe the novel “showercap” sign on T2 weighted MRI corresponding with clotted blood products overlying the point of uterine rupture.

REFERENCES:

1. Ofir K, Sheiner E, Levy A, Katz M, Mazor M. Uterine rupture: differences between a scarred and an unscarred uterus. *Am J Obstet Gynecol.* 2004;**191**(2):425-9.
2. Miller DA, Goodwin TM, Gherman RB, Paul RH. Intrapartum rupture of the unscarred uterus. *Obstet Gynecol.* 1997;**89**(5 Pt 1):671-3.
3. Hofmeyr GJ, Say L, Gülmezoglu AM. WHO systematic review of maternal mortality and morbidity: the prevalence of uterine rupture. *BJOG.* 2005;**112**(9):1221-8.
4. Spalluto LB, Woodfield CA, DeBenedictis CM, Lazarus E. MR imaging evaluation of abdominal pain during pregnancy: appendicitis and other nonobstetric causes. *Radiographics.* 2012;**32**(2):317-34.
5. O’Driscoll K, Meagher D, Robson M. Active management of labour. 4th ed. London: Mosby; 2004.
6. Furey EA, Bailey AA, Pedrosa I. Magnetic resonance imaging of acute abdominal and pelvic pain in pregnancy. *Top Magn Reson Imaging.* 2014;**23**(4):225-42.
7. Birchard KR, Brown MA, Hyslop WB, Firat Z, Semelka RC. MRI of acute abdominal and pelvic pain in pregnant patients. *AJR Am J Roentgenol.* 2005;**184**(2):452-8.
8. Petkovska I, Martin DR, Covington MF, Urbina S, Duke E, Daye ZJ, et al. Accuracy of unenhanced MR imaging in the detection of acute appendicitis: single-institution clinical performance review. *Radiology.* 2016;**279**(2):451-60.
9. Hand JW, Li Y, Thomas EL, Rutherford MA, Hajnal JV. Prediction of specific absorption rate in mother and fetus associated with MRI examinations during pregnancy. *Magn Reson Med.* 2006;**55**(4):883-93.
10. Gowland PA, De Wilde J. Temperature increase in the fetus due to radio frequency exposure during magnetic resonance scanning. *Phys Med Biol.* 2008;**53**(21):L15-8.

