A Two View Approach to Identify Uterine Sites of Ectopic Pregnancy with Ultrasound in the First Trimester

Roxanne Sicklen – Advanced Practitioner Sonographer

BACKGROUND AND RATIONALE

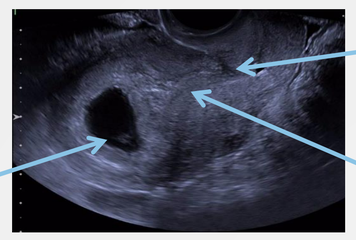
Ectopic pregnancy remains the UK's leading cause of morbidity and mortality in the first trimester of pregnancy.[1] Whilst the Fallopian tube is the most common site by far, other rare but possible sites include the ovary, peritoneal cavity and uterine sites such as the cervix, interstitial portion of the tube and caesarean scar. These uterine sites are diagnostically challenging and subsequently prone to later diagnosis. Misdiagnosing a uterine site of ectopic as an intrauterine pregnancy can lead to inappropriate management, risking the woman's fertility and in some cases even her life. Whilst there are numerous essays and case reports detailing the diagnostic features of non-tubal ectopic pregnancies, late or incorrect diagnosis remains a problem. The aim of this poster is to provide a pictorial summary of a two-view approach for ultrasound assessment of the uterus in the first trimester. These views are achievable by sonographers of all experience levels. Their inclusion into every early pregnancy ultrasound examination will improve the detection of uterine sites of ectopic pregnancy, allow for more timely intervention and reduce associated maternal morbidity.

VIEW 1 - SAGITTAL SAC TO CERVIX VIEW

The sagittal sac to cervix view describes a sagittal view of the uterus, which is recorded to demonstrate that the gestation sac is correctly sited within the cavity and continuous with the cervix. To be diagnostic of an intrauterine pregnancy, the view must fulfil the following criteria:

A sagittal view of the uterus including the fundus and the cervix

Gestation sac sited within the fundal cavity



No communication with a previous caesarean scar

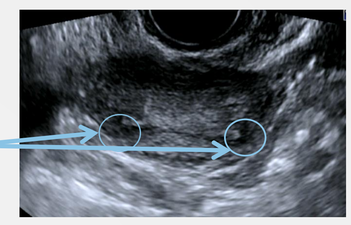
Continuity of the endometrial cavity between the gestation sac and the cervical canal

Fig 1 – Sac to cervix view in an intrauterine pregnancy (IUP)

VIEW 2 - INTERSTITIAL VIEW

The interstitial view is a transverse view of the uterine fundus to demonstrate the appearances of the interstitial portion of the tubes. The interstitial portion passes through the myometrium and can be visualised by transvaginal ultrasound as thin, hyperechoic lines extending from the lateral aspect of the fundal cavity.[2] To be diagnostic of an IUP within a normal uterus,*[3] the view must fulfil the following criteria:

Two interstitial tubes arising from the lateral aspects of the fundal cavity



Endometrial cavity widening towards the fundus

No products of conception seen separate from the cavity

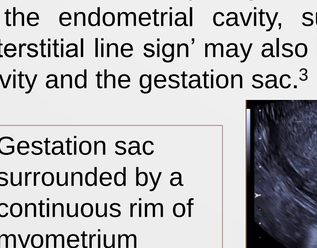
Fig 2 – Interstitial view in an early IUP*/ PUL / non pregnant uterus

CAESAREAN SCAR PREGNANCY

Two types of caesarean scar pregnancy (CSP) have been reported in the literature.[4] The sagittal sac to cervix view is paramount to timely detection of both forms.

The first type involves the gestation sac implanting deep within the caesarean scar (see fig 3). This type grows anteriorly into the scar towards the maternal bladder. This type is associated with significant maternal morbidity due to uterine rupture early in the pregnancy.[5]

Gestation sac in the anterior myometrium deviating the serosa



Myometrial thinning between sac and bladder

Empty fundal and cervical cavity

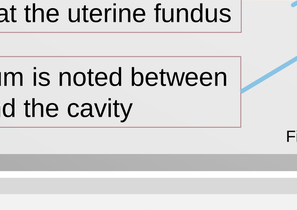
Fig 3 – Sac to cervix view in a deep implanting CSP

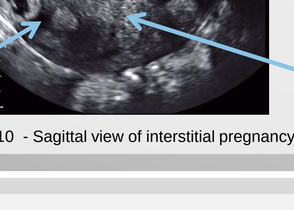
The second type of CSP involves a partial implantation into the scar site. The sac then grows into the endometrial cavity as the pregnancy progresses[4] (see fig 4). These pregnancies are much harder to diagnose beyond the early first trimester[5] but have been known to progress well into the third trimester. These CSPs are associated with late uterine rupture and placenta accreta.[6]

Gestation sac growing from the scar site into the endometrial cavity

Myometrial thinning between sac and bladder

Empty fundal cavity





Use of colour Doppler reveals a vascular supply at the scar site

Fig 4 – Sac to cervix view in a partial scar pregnancy

Fig 5 – Sac to cervix view in a partial scar pregnancy with colour Doppler

CERVICAL PREGNANCY

Diagnosis of cervical ectopic pregnancy depends upon the identification of the gestation sac within the cervical cavity, implanted below the level of the internal os.[7] Difficulties in diagnosis arise when a viable fetus cannot be identified within the sac, whereby care must be taken to differentiate between a cervical ectopic pregnancy and the cervical phase of a miscarriage.[3] The sagittal sac to cervix view can be used to identify the gestation sac within the cervix. Once its position has been established, the following criteria can be used to confirm a cervical ectopic pregnancy:[8]

An empty uterine cavity

Absence of the sliding sign**

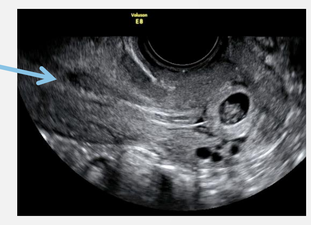


Fig 6 – Sac to cervix view in a cervical pregnancy[9]

Peripheral flow around the sac with colour Doppler

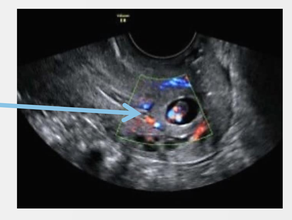


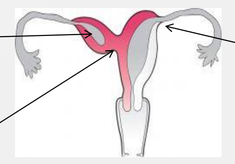
Fig 7 – Cervical pregnancy with colour Doppler[10]

CORNUAL PREGNANCY

The term cornual ectopic is often used incorrectly to describe an interstitial pregnancy. A cornual pregnancy correctly refers to a pregnancy located within a rudimentary horn of a unicornuate uterus (see fig 11). The rudimentary horn, will often contain functional endometrium but has no connection with the cavity of the unicornuate uterus.[11]

Site of cornual pregnancy

No connection to the cavity of the unicornuate uterus or cervix



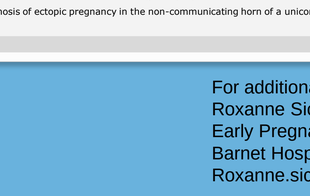
Interstitial tube arising from the fundus

Fig 11 - Diagram of unicornuate uterus with rudimentary horn

Patients with a cornual ectopic are less likely to present to the early pregnancy unit; instead presenting in the mid-second trimester following uterine rupture.[3] For this reason, it is advocated that these views are also included at routine first trimester antenatal scans to improve pre-rupture diagnosis.

The sagittal sac to cervix view is paramount to the exclusion of cornual ectopic pregnancies. Obtaining a normal sagittal sac to cervix view will never be possible in a cornual ectopic pregnancy as the rudimentary horn has no connection to the cervix.

Transabdominal midline sagittal view



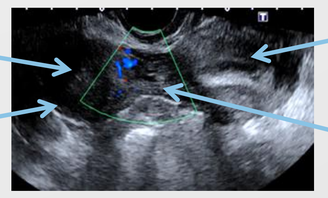
Connection between the sac and the cervix

Fig 12 - Transabdominal sagittal sac to cervix view of IUP

When the normal sagittal sac to cervix view cannot be achieved, suspicion of a cornual ectopic should be aroused. Accurate diagnosis of cornual pregnancy depends upon the detection of an empty uterus with a single interstitial tube identified adjacent to the pregnancy.[11]

Site of cornual ectopic pregnancy

Rudimentary horn



Unicornuate uterus

Fibrous band connecting rudimentary horn to unicornuate uterus

Fig 13 - Interstitial view of left unicornuate uterus with right rudimentary horn

INTERSTITIAL PREGNANCY

An interstitial ectopic is a pregnancy implanted within the interstitial portion of the Fallopian tube. Pregnancy in this area may present at a later gestation, as the surrounding myometrium protects it from early rupture.

The interstitial view is key to accurate and timely diagnosis. The view will demonstrate products of conception separate from the endometrial cavity, surrounded by a continuous rim of myometrium (see fig 7). The 'interstitial line sign' may also be seen in this view as an echogenic line between the endometrial cavity and the gestation sac.[3]

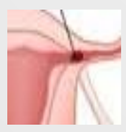
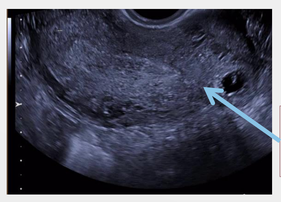


Fig 8 - Diagram of interstitial pregnancy

Gestation sac surrounded by a continuous rim of myometrium



Interstitial line sign

Fig 9 - Interstitial view of interstitial pregnancy

Achieving a normal sagittal sac to cervix view in an interstitial pregnancy is impossible (see fig 9). Because the sac is surrounded by myometrium, there is no continuity of the cavity from the sac to the cervix.

The sac is identified at the uterine fundus

Myometrium is noted between the sac and the cavity

The cervix

Endometrial continuity between the sac and cervix is impossible

Fig 10 - Sagittal view of interstitial pregnancy

CONCLUSIONS

Late or incorrect diagnosis of non-tubal ectopic pregnancy remains a problem in the UK, often because the position of the gestation sac within the uterus has not been considered or adequately assessed. If applied to everyday practice, the views advocated in this poster will change that. Whilst the need for expert opinion / tertiary referral will remain, this approach will assist early pregnancy sonographers assess the position of the first trimester gestation sac with improved confidence. Timely detection is key to appropriate management and reducing first trimester maternal morbidity.

REFERENCES

1. Lewis G (ed.).) *The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer – 2003-2005. The seventh Report into Maternal Deaths in the United Kingdom.* London:CEMACH, 2007.

2. Timor-Tritsch I. Relevant Pelvic Anatomy. *In Ultrasound in Gynaecology*, Goldstein S, Timor-Tritsch (eds). Churchill Livingstone: Philadelphia, 2007; 53.

3. Jurkovic D, Mavrelos D. Catch me if you can: ultrasound diagnosis of ectopic pregnancy. Ultrasound in Obstetrics and Gynaecology (2007), **30**; 1-7

4. Vial Y, Petignat P, Hohlfeld P. Pregnancy in a caesarean scar. Ultrasound in Obstetric and Gynaecology (2000); **16**: 592-3

5. Nakuga S, Aoki S, Kurasawa K, Takahashi T, Hirahara F. A Case of Misdiagnosed Caesarean Scar Pregnancy with a Viable Birth at 28 Weeks. Case Reports in Obstetric and Gynaecology (2014); doi : 10.1155/2014/375685

6. Timor-Tritsch I, Monteagudo A, Cali G, Palacios-Jaraquemada J, Maymons R, Arslan A, Patil N, Popiolek D, Mittal K. Ceasarean scar pregnancy and early placenta accreta share common histology. Ultrasound in Obstetrics and Gynaecology (2014); **43**: 383-395

7. Kirk E, Condous G, Haider Z, syed A, Ohja K, Bourne T. The Conservative management of cervical ectopic pregnancies. Ultrasound in Obstetrics and Gynecology (2006); **27**: 430–437

8. Kirk E, Bourne T. Diagnosis of ectopic pregnancy with ultrasound. Best practice & Research Clinical Obstetrics and Gynaecology (2009), doi: 10.1016/j.bpobgyn.2008.12.010

9. https://radiopaedia.org/articles/cervical-ectopic-pregnancy

10. https://image.slidesharecdn.com/roleofultrasoundinemergencyobstetricsandgynecology-150318100627-conversion-gate01/95/role-of-ultrasound-in-emergency-obstetrics-26-638.jpg?cb=1438360390

11. Mavrelos D, Sawyer E, Helmy S, Holland T, Ben-Nagi J, Jurkovic D. Ultrasound diagnosis of ectopic pregnancy in the non-communicating horn of a unicornuate uterus (cornual pregnancy). Ultrasound in Obstetrics and Gynaecology (2007); **30**; 765-770

* Visible up to 7 weeks in an intrauterine pregnancy. Visible to later gestations in an ectopic pregnancy

** When the sac fails to slide against the cervical canal following the application of pressure with the transvaginal probe to the cervix

For additional information please contact:
Roxanne Sicklen
Early Pregnancy and Emergency Gynaecology Unit
Barnet Hospital (Royal Free London NHS Foundation Trust)
Roxanne.sicklen@nhs.net