Diagnostic Imaging Pathways - Bleeding (First Trimester)

Population Covered By The Guidance

This pathway provides guidance on the imaging of pregnant patients with unexplained first trimester bleeding.

Date reviewed: October 2013

Date of next review: 2017/2018

Published: November 2013

Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

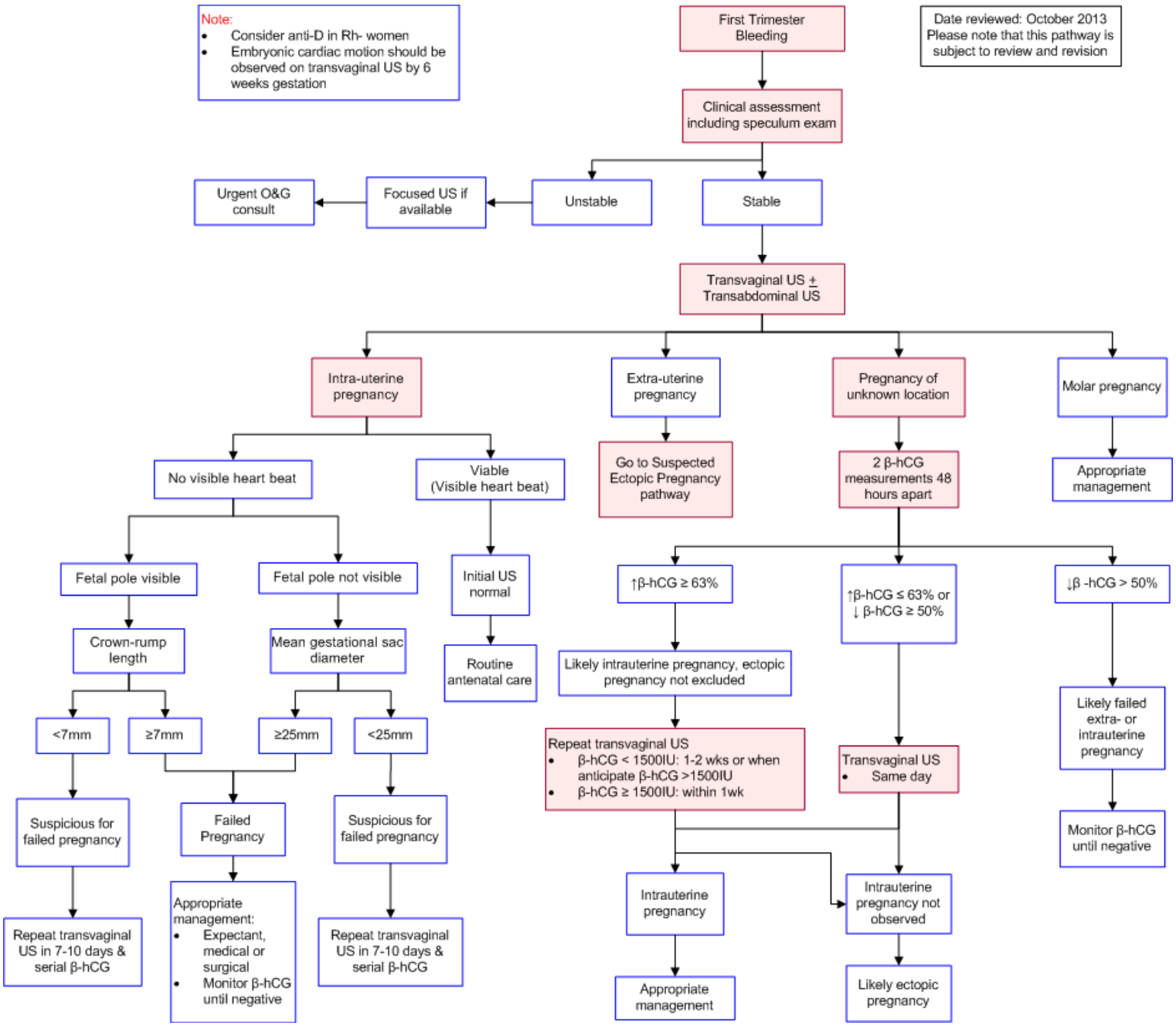
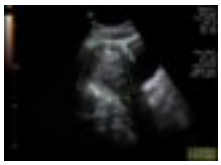


Image Gallery

Note: These images open in a new page

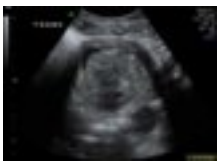
1a



Failed Pregnancy

Image 1a and 1b (Ultrasound): This scan shows an anteverted uterus measuring 102 mm in axial length. Within the uterine cavity is echogenic material measuring 67 x 35 x 50 mm. A small amount of fluid is seen superior to this. The appearance is consistent with retained products of conception.

1b



Teaching Points

- Major causes of first trimester bleeding are
    - Ectopic pregnancy
    - Threatened or impending miscarriage
    - Uterine, cervical or vaginal pathology; e.g. infection
    - Physiological; e.g. implantation bleeding
- The first step in establishing a cause of bleeding is to obtain a detailed history and perform a physical and speculum examination
- Transvaginal US is more sensitive than trans-abdominal US and can detect a viable gestation earlier in pregnancy
- Depending on the findings at ultrasonography, further biochemical investigations and medical or surgical interventions may be necessary

Causes of First Trimester Bleeding

- Causes of bleeding in early pregnancy include
    - Ectopic pregnancy
    - Threatened or impending miscarriage
    - Cervical, vaginal or uterine pathology; e.g. infection
    - Physiological e.g. bleeding due to implantation of the pregnancy (typically 10-14 days after fertilisation), cervical ectropion
- Ultrasound in the first trimester is not routinely recommended but is often performed for the following indications 3-7
    - Assessment of gestational age and sac
    - Detection of early pregnancy failure
    - Assessment of fetal number
    - Early detection of major fetal abnormalities
    - Nuchal translucency
    - Assessment of ovaries, uterus and adnexa
    - Exclusion or confirmation of ectopic pregnancy
    - Patients with a previous ectopic pregnancy

Transvaginal Ultrasonography

- More sensitive than transabdominal ultrasonography and allows earlier gestational sac visualisation and earlier diagnoses of viable intrauterine or ectopic pregnancies 14
- Superior to transabdominal US in visualising fetal anatomy and detecting fetal structural and chromosomal abnormalities 12,15
- In intrauterine pregnancy of uncertain viability, cut-off transvaginal US measurements for the diagnosis of early pregnancy demise must be highly specific with a low false-positive rate (FPR) to

avoid harmful misdiagnosis. A cut-off of CRL ?7mm and MSD ?25mm is based on recommendations from a multicentre observational study and systematic review 16,17 and is included in the Society of Radiologists in Ultrasound, Australian Society for Ultrasound in Medicine and the National Institute for Health and Clinical Excellence and the Royal College of Obstetricians and Gynaecologists clinical guidelines 1,5,18
- At 6-9 weeks gestation, CRL has less interobserver variability than MSD on transvaginal US 19
- Visualisation of embryonic cardiac activity confirming live intrauterine pregnancy is generally visible transvaginally by 46 days menstrual age 2
- Ultrasonography is less accurate in the presence of bleeding 20
- Patients with indeterminate ultrasonography findings require further evaluation with follow-up transvaginal ultrasound and/or serial quantitative ß-hCG levels as about 10-20% of these patients may have a final diagnosis of ectopic pregnancy 21-23

Transabdominal Ultrasonography

- Useful screening test for early pregnancy complications such as threatened abortion, ectopic pregnancy, blighted ovum and trophoblastic disease 8,9
- Correlation of sonographic findings with simultaneous maternal serum human chorionic gonadotropin (ß-HCG) levels is useful in evaluation of early pregnancy complications, particularly when a living embryo is not visualised 9,10
- Allows identification of an intrauterine pregnancy, which is the single most important finding for the exclusion of ectopic gestation as the presence of both intra- and extra-uterine pregnancy is very rare 9
- Enables examination of early fetal anatomy and measurement of nuchal translucency, thus allowing screening of a majority of fetal structural and chromosomal abnormalities in early pregnancy 11,12
- Allows assessment of the outcome of early first-trimester pregnancies with slow embryonic heart rates (embryonic HR <70bpm is associated with fetal demise in 100% of patients; and if the embryonic HR is <90bpm in the first trimester, close follow-up of the pregnancy is recommended) 13
- Follow-up second trimester US is still required to detect significant abnormalities missed on first trimester US and for placental localisation 11

Serum Human Chorionic Gonadotrophin (ß-hCG) Levels in Pregnancy of Unknown Location

- ß-hCG levels must be interpreted together with the clinical picture and US findings, and should not be used solely to determine the pregnancy location and determine management. ß-hCG levels can overlap between viable and nonviable intrauterine pregnancy and ectopic pregnancy and are affected by multiple gestation 1,18,24,25
- Serum ß-hCG ratios from serial ß-hCGs (e.g. ß-hCG at 48hrs compared to 0 hrs) perform better compared to single ß-hCG levels in dictating appropriate management alongside imaging and clinical findings 26
- The level of evidence is low and heterogenous. At present, timing of diagnostic testing is consensus based. 1 The pathway is adapted from the National Institute for Health and Clinical Excellence and Royal College of Obstetricians and Gynaecologists clinical guideline. 1 Further research of higher quality is needed
- A ß-hCG rise >63% in 48 hours has 87% sensitivity, 98% specificity, 90% positive predictive value and 97% negative predictive value for diagnosis of viable intrauterine pregnancy, with a positive

and negative likelihood ratio of 42.8 and 0.13 respectively 27
- Serum ß-hCG levels double approximately every 48 hours in 85% of normal intrauterine pregnancies of between 4 and 6 weeks' gestation 28
- The slowest reported rise over 48 hours associated with a viable intrauterine pregnancy is 53% 29
- 80% of ectopic pregnancies are associated with a rise in ß-hCG of < 66% 22,28

References

Date of literature search: June 2013

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

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