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PROTOCOL #1

PROTOCOL #1 – Testing and Triage, University of New Mexico

Ultrasound Evaluation of Ectopic Pregnancy

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Making a diagnosis of ectopic pregnancy must be based on predictive criteria of how and when a normal pregnancy is visualized, correlated with progressing serum beta hGC levels.

Considerations for f/u exams are based on knowledge that the gestational sac grows .8-1.2mm PER DAY; therefore, confidence for indefinitive diagnosis is improved with f/u exam at a time interval of two to three days. All diagnostic criteria are based on MA, not GA.

The Normal Intra-uterine Pregnancy

Consistent diagnosis criteria for normal IUP diagnosis should include the following:

- At the time of implantation, the conceptus is .1mm in size. Nothing will be seen, no matter where it is implanted.
- At 4 weeks MA, the sac size measures 1-3mm and is round in contour (as compared to elliptical shape of FF within the endometrial cavity); however, only one-third of gestational sacs seen will demonstrate a double decidual reaction (DDR).
- At 5 weeks MA, the sac size measures 1 cm, though no evidence of an embryonic pole is typical. By the end of 5 weeks MA, the yolk sac may be seen. A DDR will likely be present, but not necessary until week 6.
- The DDR is reliably seen at 6 weeks MA, when the sac size is at least 1.5cm; however, the yolk sac may be the only additional finding in the gestational sac in the early 6th week MA and the small embryonic pole located directly adjacent to the YS will reliably be seen by late 6 weeks MA.
- The normal yolk sac measures 5-6 mm. A YS, measuring <3mm and >7mm carries a poor prognosis and, typically, the pregnancy is lost.
- BOTH the corpus luteum and the peritrophoblastic flow have a concentric flow pattern on color Doppler, this being the most confusing gray area in the early gestation. Since the incidence of a heterotopic gestation is quoted as 1:30,000 to 1: 2100, the presence of a clear sac seen within a DDR is a reassuring sign and should be followed up in 2-3 days for re-assessment.
- At 7 weeks MA, the sac size consistently measures at least 2 cm , and the yolk sac and embryonic pole is seen. Small limb buds are seen laterally. There *must* be embryonic heart motion visualized. If it is not seen, a first trimester embryonic demise diagnosis can be made. (The embryonic heart begins to beat at 5 weeks MA.)
- By 8 weeks, the sac size consistently measures at least 3cm, and the yolk sac and embryo are well visualized. The amniotic membrane is well seen surrounding the entire embryo. Hand plates are now present and may be seen as limbs are developing.

- From 9-12 weeks, findings are a matter of growth, though normal physiologic herniation of the small bowel is seen. By 12 weeks, two important findings are consistent:
    - The YS will no longer be seen, as it is compressed by the fusing amniotic membrane
    - The physiologic herniation should be returned to the intra-abdominal location.

	What You See When					
MA	Approximate Sac Size	Yok Sac Seen?	DDR	CRL Measurable?	EHM/FHM Seen?	Amniotic Membrane Seen?
4 wks	1-3 mm	No	No	No	No	No
5 wks	1 cm	No	No/Yes	No	No	No
6 wks	1.5 cm	Yes	Yes	No/Yes	Yes	No
7 wks	2 cm	Yes	Yes	Yes	* Yes	No
8 wks	3 cm	Yes	Yes	Yes	Yes	Yes
9-11 wks	4-5 cm	Yes	Yes	Yes	Yes	Yes
12 wks	6 cm	No	Yes	Yes	Yes	Yes

Diagnosis of Ectopic Pregnancy

The only pathognomonic finding for ectopic pregnancy is a gestation sac WITH heart motion located outside the endometrial cavity. All other findings are non-specific, including free fluid within the PCDS.

- Earliest possible visualization of the gestational sac occurs when the hCG = 450-800 mIU/ ml
- By 1800-2000 mIU/ml, the GS should seen in nearly ALL normal IUPs
- The YS is typically seen at 7200 mIU/ml
- The embryo typically seen at 10,800 mIU/ml
- Although there is a general rule that the hCG doubles approximately every two days, the range for normal IUP change in hCG is actually 1.2- 2.2 times every 48 hours. Two separate studies have shown that @ **19%** of u/s exams will have indeterminate findings when the GS is expected to be seen.
    - (Braffman, 1994) Used 1500 mIU/ml
    - (Mehta et al, 1997) Used 2000 mIU/ml as cut-off; 19% had normal pregnancies

No One Finding Stands Alone

Because pelvic pain and or vaginal bleeding is one of the most common reasons for emergency department visits, the etiologies for this diagnosis in this situation are beyond ruling out ectopic pregnancy. They include:

- Ectopic Pregnancy
- Subchorionic Bleed (Implantation Bleed)
- Threatened, Incomplete, Complete AB

- Normal IUP w/ Hemorrhagic Corpus Luteum
- Normal IUP w/ Appendicitis
- Normal IUP w/ ureteral calculi

The clinical presentation is extremely variable. In pts w/ clinical triad of pain, vaginal bleeding and palpable adnexal mass, only 1-13% ARE ectopic.

Therefore, pelvic pain, vaginal bleeding or both are not specific to any one diagnosis.

The clinical exam is unreliable because, of those found to have an ectopic pregnancy:

- 10% have no pain
- 21% have no vaginal bleeding
- 29% have no tenderness
- 36% have no adnexal mass

Furthermore, (Lipscomb et al, NEJM 1999) demonstrated that:

- While 70-83% ectopic pregnancies had peritoneal compartment fluid
- Only 50-62% of those had ruptured tube

<u>U/S Exam Protocol:</u>

- General survey through the pelvis
- Document ML sag and transverse uterus to demonstrate the endometrial contents
- Measure gestational sac, YS and embryonic pole if present
- If NOT present, document color Doppler of endometrial cavity and ovary to assess flow pattern
- Document both ovaries/adnexal (sagittal and transverse cuts)
- If free fluid is present, document FF at PCDS AND presence or absence of FF within the sub-hepatic space

Goal of u/s examination:

- Confirm IUP and normal adnexa

<u>U/S Findings:</u>

- Definitive Dx Ectopic made only when live embryo w/ EHM+++ is seen
- Normal IUP GS (but NOT ALL) will be seen by when hCG reaches @ 1800 mIU/ml
- Slow rising or plateau of levels demands repeat hCG levels and f/u u/s exam
- With <u>absence</u> of GS, YS, embryo or DDR, index of suspicion goes up
- Ectopic may or may not demonstrate definitive single decidual reaction (Vera) in response to hCG

<u>Bottom line</u> is to be careful @ premature “definitive” Ectopic Diagnosis

- **“Empty” uterus seen below discriminatory zone is COMPLETELY INDETERMINATE**
- Can also be normal IUP or complete spontaneous Ab
- Remember, 2 sep studies have shown that @ 19% of normal pregnancies do not demonstrate GS at 1500-2000 mIU/ml