

## 4 First Trimester Ultrasound

### Introduction

Ectopic pregnancy (EP) is the leading cause of maternal mortality in the United States and is estimated to have a prevalence of 8% in pregnant patients presenting to the ED for any complaint (1,2). Indeed, the incidence of ectopic pregnancy has been rising since the mid-1980s (3). Therefore, any female of child-bearing age who comes to the emergency room with abdominal pain, vaginal bleeding, near-syncope, or syncope has ectopic pregnancy on the differential. This is a “can’t miss” diagnosis. Given the volume of female patients presenting with these complaints, an algorithm incorporating first trimester ultrasound can be timesaving for the physician and patient but must increase efficiency without compromising safety.

The evaluation for ectopic pregnancy differs from other indications for bedside ultrasound. Evaluation of the uterus seeks to confirm an intrauterine pregnancy (IUP), ruling out ectopic gestation by exclusion. Visualization of the actual ectopic pregnancy is not the goal. In contrast, evaluation of the aorta, heart, and other organs typically confirms pathology (aneurysm, asystole, hydronephrosis) via direct visualization.

There are instances where an extrauterine gestation will be seen on bedside ultrasound or free fluid will be seen in a hypotensive pregnant female and ectopic pregnancy will be diagnosed or inferred. This will be the exception, however, to how bedside ultrasound is used for this application. Bedside ultrasonography instead will be used to increase the number of IUP cases that can be definitively diagnosed and discharged in the ED without further imaging.

One other important subgroup of patients that should be mentioned is those women who are undergoing in vitro fertilization (IVF) or assisted reproduction and who present to the ED with pain or vaginal bleeding. Because the risk of heterotopic pregnancy in these women is so high, it is the view of the authors that these patients should *always* have formal ultrasonography done by gynecology or radiology and should always have a formal gynecology consultation (4–7). Others have suggested that there are other subgroups of patients (history of ectopic pregnancy, known fallopian tube scarring) with unacceptably high rates of heterotopic pregnancy that should also always undergo formal sonography and consultation, but this recommendation is not universally practiced.

### Focused Questions for First Trimester Ultrasound

The focused questions for first trimester ultrasound are as follows:

1. Is there an intrauterine pregnancy?
  - a. Is there an intrauterine yolk sac, fetal pole, or fetal heartbeat?

- b. Anything else (including an intrauterine gestational sac) is NOT an intrauterine pregnancy and a formal study or a formal consultation should be performed.

## Terminology

Terminology used when describing first trimester pregnancy can be confusing, and it is important that emergency physicians are precise when describing their findings. Miscommunication can lead to emotional distress and unsafe assumptions. The following list defines terms commonly used in first trimester pregnancy:

- **Spontaneous Abortion and Miscarriage** – synonymous terms in early pregnancy that refer to spontaneous passage of the products of conception (POC) through the cervical os.
- **Threatened Abortion** – a pregnancy prior to 20 weeks of gestation accompanied by cramping and vaginal bleeding.
- **Incomplete Abortion** – a condition in which some POC remain with the uterus after miscarriage.
- **Complete Abortion** – a condition in which all products of conception have passed through the os and none remain in the uterus.
- **Inevitable Abortion** – a condition in which the patient's cervix is dilated and POC are often seen exiting the cervical os.
- **Missed Abortion** – refers to the clinical situation in which an intrauterine pregnancy is present but no longer developing normally. The gestation is termed a missed abortion only if the diagnosis of incomplete abortion or inevitable abortion is excluded. Patients with this condition may present with an anembryonic gestation (empty sac or blighted ovum) or with fetal demise prior to 20 weeks' gestation.
- **Blighted Ovum** – an ambiguous term that formerly indicated that no embryo ever developed. This term was synonymous with the term *anembryonic gestation*. Recent advances in ultrasound scanning have shown that a very early embryo usually develops. Therefore, *embryonic resorption* has become the more modern and appropriate term.
- **Embryonic Demise** – refers to a pregnancy in which no fetal heartbeat or motion is seen despite a clearly visible embryo of a gestational size where a fetal heartbeat would be expected.

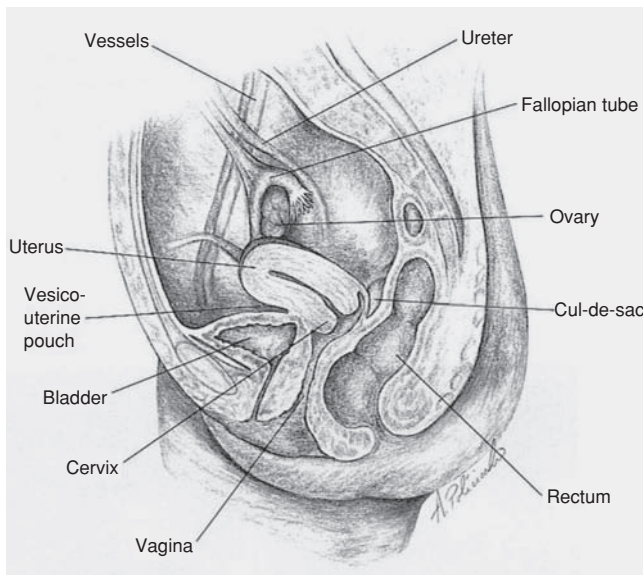
Again, these terms are important to the emergency physician only in terms of clear communication. The purpose of performing bedside emergency first trimester ultrasound is to diagnose an intrauterine pregnancy in patients with an acceptably low risk of heterotopic pregnancy (non-IVF, no history of ectopic pregnancy) so they can be discharged and followed up as outpatients safely. If an intrauterine pregnancy is not diagnosed, most emergency department patients should be referred for formal sonography and gynecology consultation.

## hCG Levels

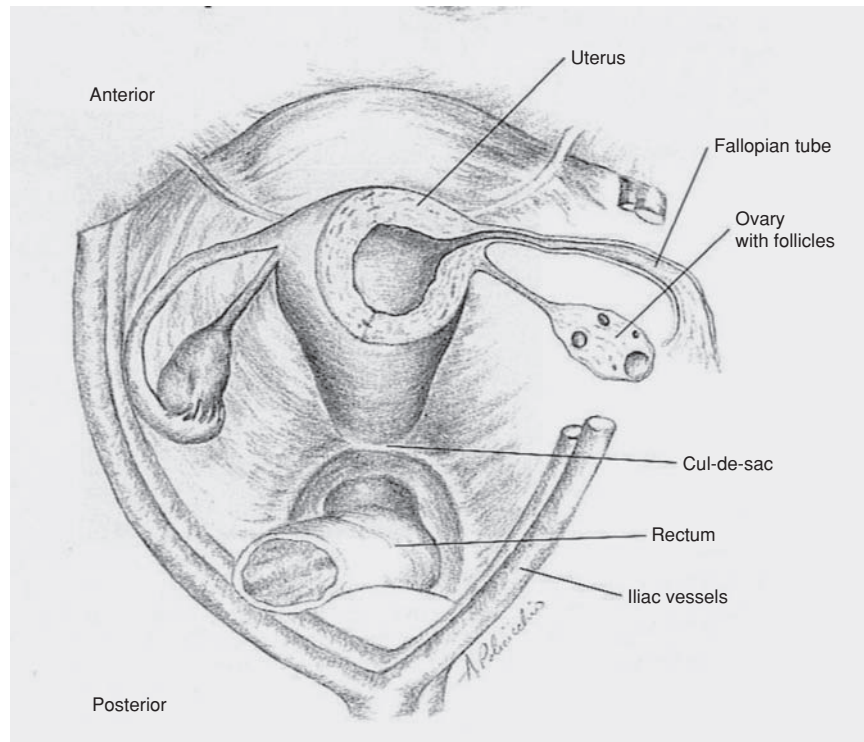
Another area of much confusion and debate is correlation of serum human chorionic gonadotropin (hCG) levels with ultrasound findings. The first important rule for the emergency physician is there is no hCG level at which a patient can be ruled out for ectopic pregnancy. Ectopic pregnancies have been described with levels <30 IU/mL, and very frequently <1,000 IU/mL (8,9). Therefore, pelvic sonography should be done for any patient who is pregnant regardless of beta-hCG (8–10). The concept of a discriminatory zone becomes more significant after pelvic sonography is complete. The discriminatory zone is the level of beta-hCG at which an intrauterine pregnancy should be seen 100% of the time. Transvaginal ultrasound is able to visualize intrauterine pregnancies earlier, and the discriminatory zone is usually accepted as 1,500 IU/mL. The discriminatory zone for transabdominal ultrasound is usually believed to be between 4,000 and 6,500 IU/mL because it uses a lower-frequency probe and thus has images with less resolution (11). Therefore, if an ultrasound is indeterminate and the serum hCG is greater than the discriminatory zone, the suspicion for ectopic pregnancy should be increased (12). However, serum quantitative hCG levels are mostly helpful in following a patient over time, and there is no level at which a patient will not require an ultrasound (except zero).

## Anatomy

There are several anatomic relationships that can help guide the sonographic evaluation of the female pelvis (Figure 4.1). The bladder is always anterior to the uterus. The ovaries are usually found at the end of the fallopian tubes and



**Figure 4.1**  
Normal female anatomy. Image from *Gray's Anatomy* textbook; courtesy of Elsevier.



**Figure 4.2**  
 Normal female anatomy. Note the relation between the ovaries and the iliac vessels; ovaries are found superior and medial to vessels on ultrasound imaging. Image from *Gray's Anatomy*; courtesy of Elsevier.

are anterior and medial to the iliac vessels (Figure 4.2). If the bladder is full, it is a good acoustic window for visualizing the uterus transabdominally. However, it is easier to visualize the uterus transvaginally with an empty bladder because then the uterus will be anteroflexed in most cases over the vaginal introitus.

## Technique

There are two approaches to performing the sonographic exam of an early pregnancy: transabdominal and transvaginal approaches. Usually, a transabdominal scan is done first while the patient still has a full bladder. The patient then can empty her bladder prior to the transvaginal scan if the transabdominal scan was nondiagnostic for intrauterine pregnancy. In patients with unclear gestational age, it is even more important to perform an abdominal scan first. Occasionally, a second trimester fetus will be visualized transabdominally, and a nonsterile pelvic exam (which would increase the risk of infection) can be avoided.

## Transabdominal Scanning Technique

### Probe Selection

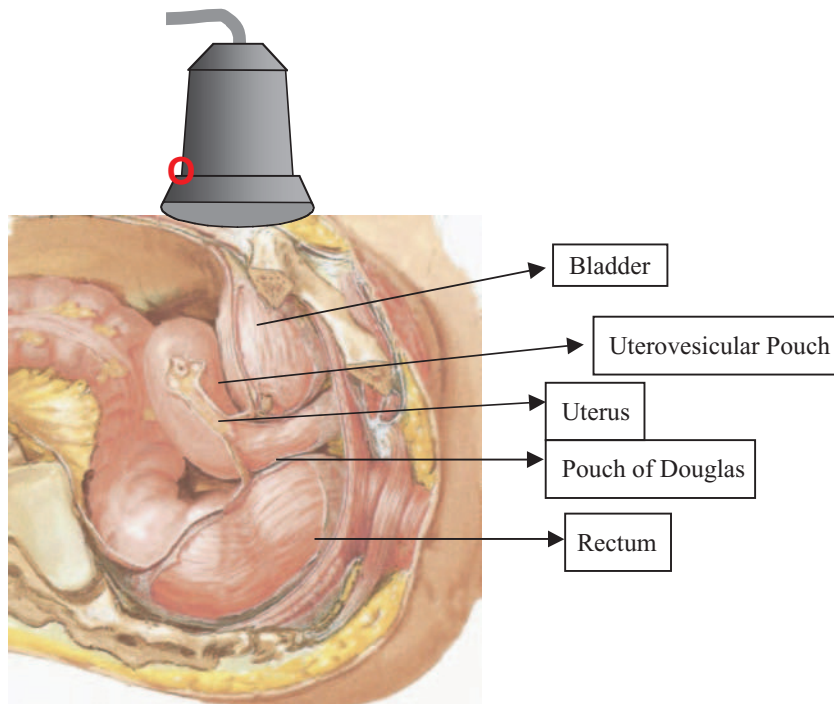
Use a 3.5-MHz curvilinear transducer for the transabdominal scan.

### Views

At least two views are necessary for complete evaluation of the uterus: a transverse view and a longitudinal view both demonstrating the endometrial stripe (and uterine contents, if any).

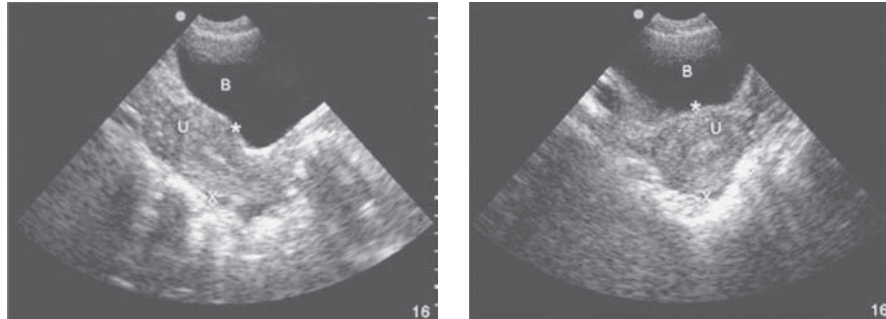
Like the suprapubic window used in the FAST and renal exams, the transabdominal ultrasound of the patient with an early pregnancy requires a full urinary bladder. An inadequately filled bladder is one of the most common causes of a technically inadequate transabdominal exam.

Begin by placing the probe above the pubic symphysis (Figure 4.3). Start in the midline, and use both the sagittal/longitudinal and the transverse orientations. Again, careful angulation and movement off the midline may be necessary to obtain optimal views of the structure being evaluated (and to see the endometrial stripe). Remember when scanning longitudinally that the probe marker is to the patient's head, and when scanning transversely, the probe marker is to the patient's right (Figure 4.4).



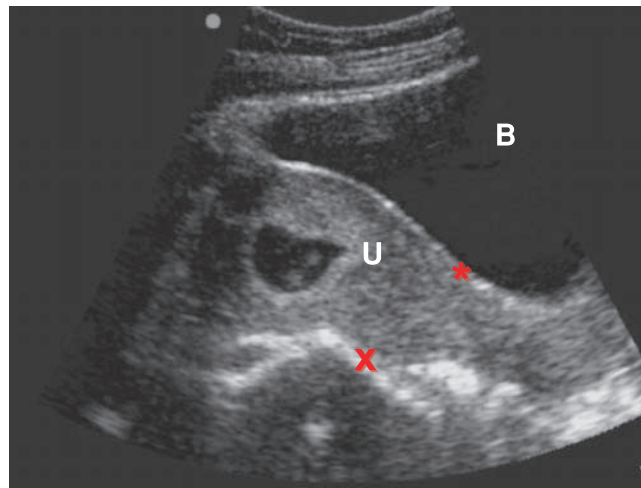
**Figure 4.3**

Probe positioning and anatomy in transabdominal scanning. Drawing from *Netters Atlas of Human Anatomy*, 2nd ed. 1997, plate 363.



**Figure 4.4**

Transabdominal images of non-pregnant female pelvis-longitudinal (left) and transverse (right). Images of a normal uterus. B = bladder, U = uterus, \* = uterovesicular space, X = pouch of Douglas.



**Figure 4.5**

Transabdominal imaging of pregnant female pelvis – longitudinal (*left*) and transverse (*right*) images of a normal uterus. B, bladder; U, uterus; \*, uterovesicular space; X, pouch of Douglas.

In this transabdominal longitudinal image of uterus with IUP, the bladder (B) is noted anteriorly, with the uterus (U) and then rectum (R) noted posteriorly. The uterovesicular pouch is noted with an asterisk (\*) anterior to the uterus, and the pouch of Douglas is noted with an (X) posterior to the uterus (Figure 4.5).

## Transvaginal Scanning Technique

### **Probe Selection**

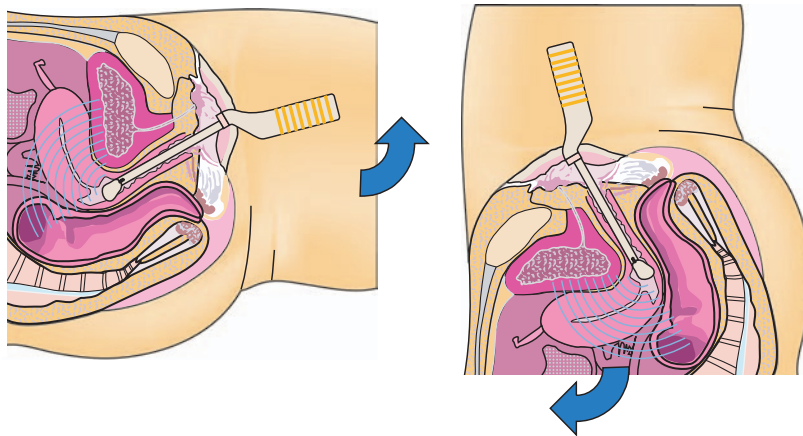
Most manufacturers have a high-frequency intracavitary or transvaginal probe that is specifically made for transvaginal scanning. The frequency ranges are usually from 5 to 9 MHz.

**Views**

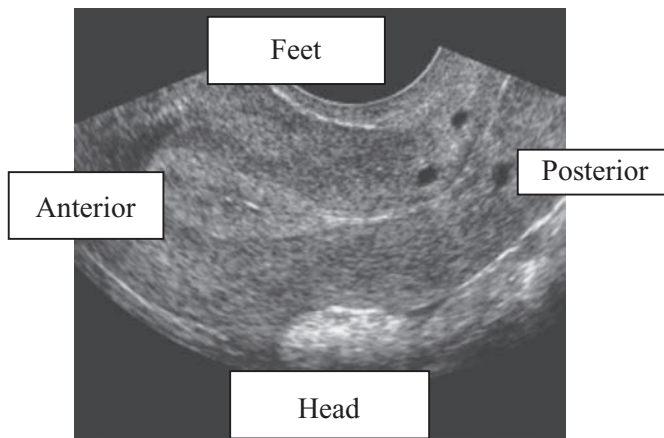
Again, at least two views are necessary for complete evaluation of the uterus: one transverse view and one longitudinal view, both demonstrating the endometrial stripe (and uterine contents, if any).

After performing a transabdominal scan, the patient should empty her bladder to facilitate the transvaginal scan. As with all invasive procedures, before proceeding to the transvaginal exam, the physician should counsel the patient about the exam and obtain consent. The probe must be cleaned and sterilized, and the probe tip covered with a small amount of conductive gel; a sterile condom or cover is then placed over the probe and sterile gel is placed on the outer condom tip. Holding the probe with the indicator or marker to the ceiling, the probe is inserted into the vaginal canal (Figure 4.6).

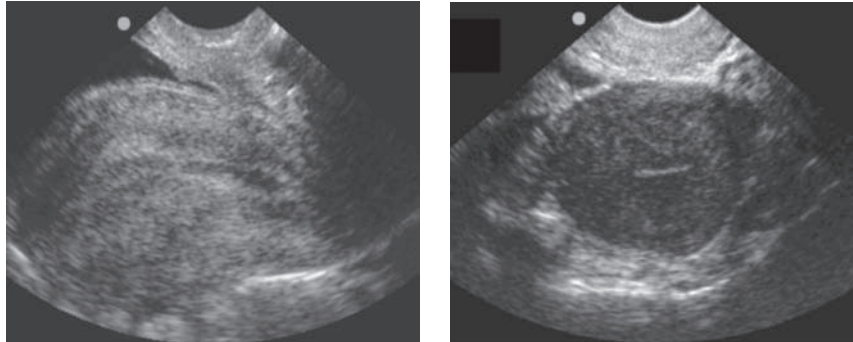
The first view with the marker pointing to the ceiling should give the image in Figure 4.7. It is important to fan through the entire body of the uterus; in



**Figure 4.6**  
Probe positioning in transvaginal scanning.



**Figure 4.7**  
Transvaginal sagittal or longitudinal view of a nonpregnant uterus. Hyperechoic stripe represents the endometrium. Labels show probe orientation.



**Figure 4.8**

Longitudinal and transverse transvaginal view of the uterus – anechoic fluid in the left-hand corner of the longitudinal image is the bladder. To image the cervix on the longitudinal image, the handle of the probe would be brought up and the probe tip angled toward the posterior fornix.

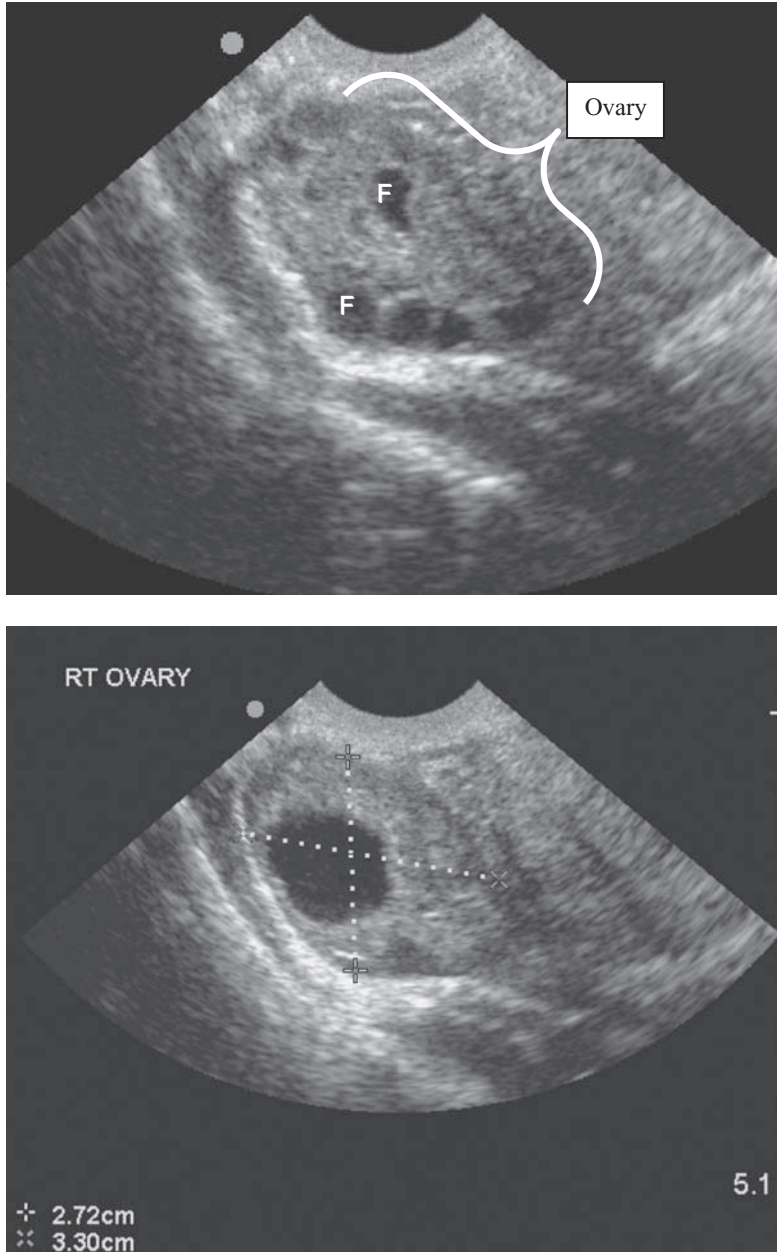
the longitudinal plane, make sure to fan the probe side to side and see the entire uterus (the endometrial stripe should disappear and reappear as you fan). To bring the cervix into the viewing window, bring the transducer handle toward the ceiling. This will angle the tip toward the posterior fornix of the vaginal canal, which is where the cervix is located in most women (Figure 4.8).

After scanning in the longitudinal plane, turn the probe marker to the patient's right. You will then see the uterus in a transverse plane (Figure 4.8). Again, it is important to fan through the entire uterus, so fan the probe anteriorly and posteriorly to see the entire fundus. The endometrial stripe should again disappear and reappear as you fan. At this point, the fallopian tubes can be traced out to visualize the ovaries. If you see the ileac vessels, then the ovaries should be anterior and medial. The ovaries will often have multiple follicles (F) that look like multiple cysts (Figure 4.9). This can help identify them. However, the emergency physician should remember that he or she is doing this scan to identify an intrauterine pregnancy. Performing a complete ovarian ultrasound is beyond the scope of this text.

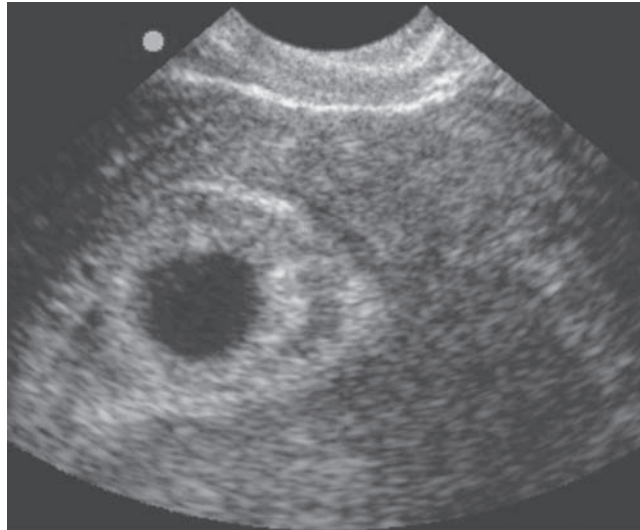
## Normal Images in Early Pregnancy

As mentioned previously, to be conservative and to practice with the greatest safety, only an intrauterine yolk sac, fetal pole, or intrauterine fetal heart-beat should be identified as an intrauterine pregnancy on bedside ultrasound scans. The reason for this is that although a gestational sac can be an early marker of a normal gestation, it can also be the result of hormonal stimulation caused by an ectopic pregnancy, also known as “pseudogestational sac of ectopic pregnancy” (3,13). This finding is seen in up to 10% to 20% of all ectopic pregnancies (13). Therefore, it is not recommended to use this finding as a sign





**Figure 4.9**  
Two normal transvaginal views of the ovary. Most women will have multiple visualized follicles – some may be quite prominent, depending on luteal stage.

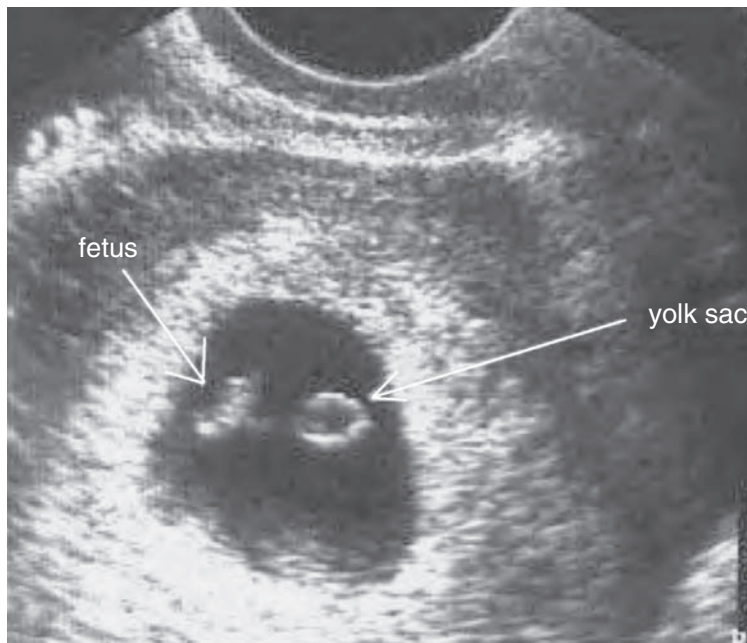


**Figure 4.10**  
 Double decidual sign. The hypochoic layer surrounding the gestational sac can be seen; however, because there is no yolk sac visualized within the gestational sac, this cannot be definitively called an intrauterine pregnancy.



**Figure 4.11**  
 Using the zoom function present on most bedside ultrasound machines, the “sac within the sac,” or the yolk sac (black arrow), can be seen. This is the first definitive sign of an intrauterine pregnancy.

of normal gestation. The “double decidual sign” has also been described as a reliable marker for early intrauterine pregnancy (Figure 4.10). This is a sac with echogenic and hypochoic rings surrounding it. However, even in the radiology and obstetric literature, there is debate as to the accuracy of this finding, and it is not present in all cases. Thus, before the appearance of a yolk sac, an IUP cannot be definitively diagnosed in the ED.



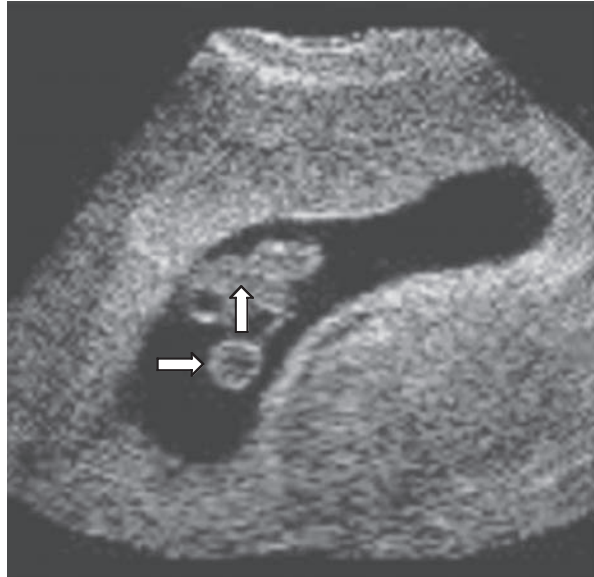
**Figure 4.12**  
Transvaginal image of the yolk sac and the fetal pole.

When first visible, the gestational sac contains no identifiable structures. By the time its diameter reaches 5 to 8 mm, the yolk sac (“sac within the sac”) should be detectable (Figure 4.11).

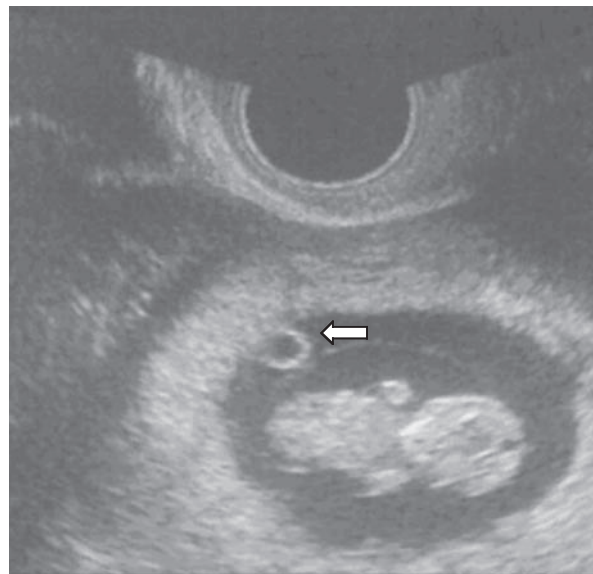
By the end of the sixth menstrual week, the mean diameter of the gestational sac grows by 1 mm/day, the yolk sac appears, and embryonic cardiac activity may be seen between the yolk sac and the wall of the chorionic sac even before the embryo is measurable. At this point, the tiny embryo is surrounded by a small amniotic membrane. This complex, located between the yolk sac and the chorionic wall, is termed the fetal pole (Figure 4.12).

The embryo grows by about 1 mm/day in crown–rump length, and by the end of the seventh menstrual week, the embryo measures 5 to 10 mm (Figure 4.13 and Figure 4.14) and should exhibit cardiac motion on both *transvaginal* and *transabdominal* scanning.

The gold standard for the diagnosis of a living intrauterine pregnancy is the visualization of embryonic cardiac activity. This may be seen as early as 41 to 43 menstrual days (6 weeks) or when the mean sac diameter is 12 to 16 mm. Physicians should use M mode to highlight cardiac motion (Figure 4.15) because it uses less acoustic power than Doppler and thus theoretically transmits less acoustic energy to the fetus (see Chapter 1). The alternating black and gray bands represent chamber movement. Heart rate is

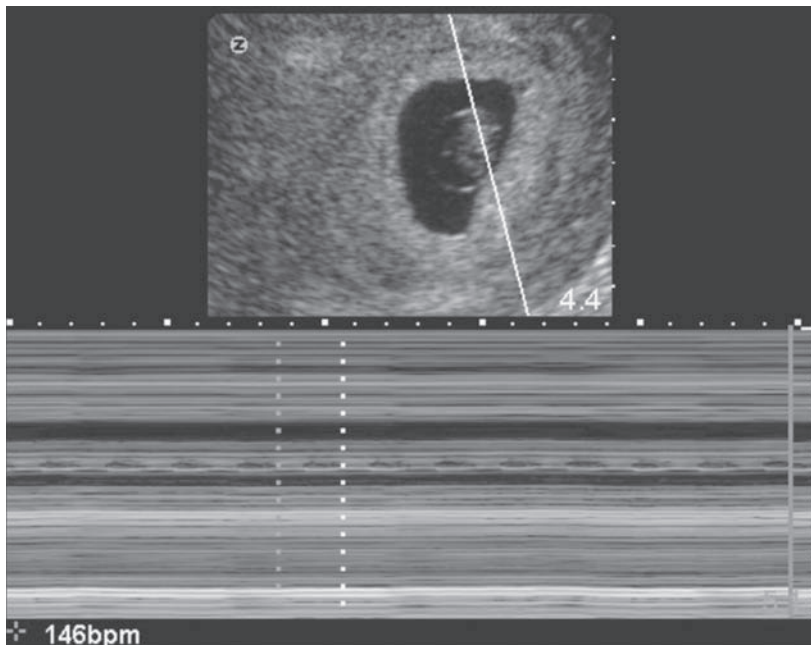


**Figure 4.13**  
Seven-week-old embryo  
(*up arrow*) and yolk sac  
(*side arrow*) on a  
transvaginal sagittal  
window.



**Figure 4.14**  
Ten-week-old fetus and  
yolk sac (*arrow*) on  
transvaginal window.

calculated by measuring one cycle length and determining the cycles per second based on that measurement. In addition, many bedside ultrasound machines will have an automatic fetal heart calculation function in their M mode menu.



**Figure 4.15**  
Fetal heart rate (FHR) by M mode (FHR 146 seen on bottom of screen).

## Ectopic Pregnancy

Ectopic pregnancy occurs in about 2% of all pregnancies in the United States. However, some studies have reported an incidence of 7.5% to 13% among symptomatic patients who present to the emergency department (1–3).

Transvaginal ultrasound can detect the embryo in ectopic pregnancies. The presence of an adnexal mass and/or cul-de-sac fluid in a patient with no intrauterine gestation and measurable circulating hCG is highly specific for the diagnosis of ectopic pregnancy. Absence of these sonographic findings does not exclude the diagnosis because up to 30% of women with extrauterine gestations have no sonographic evidence of an adnexal mass or pelvic intraperitoneal fluid (1–3,12,17,19). The majority (95%) of ectopic pregnancies occur in the fallopian tubes. Ovarian, abdominal, cervical, and interligamentary ectopics are rare. However, these non-fallopian ectopics carry a higher mortality because they rupture at a later gestational age and, thus, hemorrhage is more rapid. To prevent mistaking a cervical or corneal ectopic for an intrauterine pregnancy, one must determine that a thick enough “myometrial mantle” exists to sustain the gestation within the uterus. Thus, the thinnest stripe of myometrium seen surrounding the gestation should be measured (Figure 4.16). Anything <8 mm is concerning for a cervical or corneal/interstitial ectopic pregnancy, and proper consultation should be arranged (1–3).

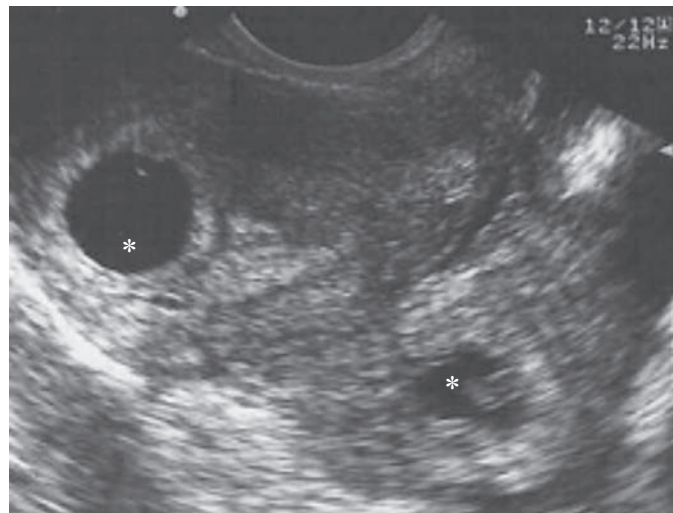
**Figure 4.16**  
Image showing where to measure the myometrial mantle. Image courtesy of Dr. Greg Press, University of Texas – Houston, Hermann Memorial Hospital, Houston, Texas.

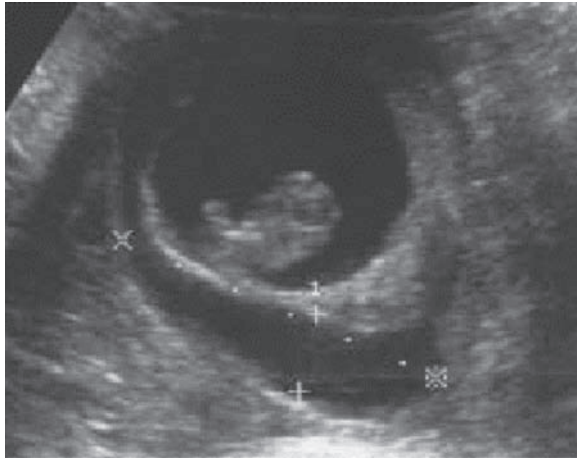


## Abnormal Images

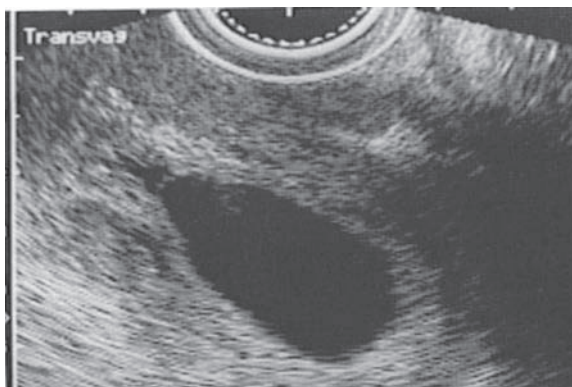
The following images of abnormal pelvic ultrasound scans.

**Figure 4.17**  
Heterotopic pregnancy. Two gestational sacs are seen (\*). The sac in the lower right-hand corner of the screen is outside the uterine cavity. Courtesy of Dr. Greg Press, University of Texas – Houston, Hermann Memorial Hospital, Houston, Texas.

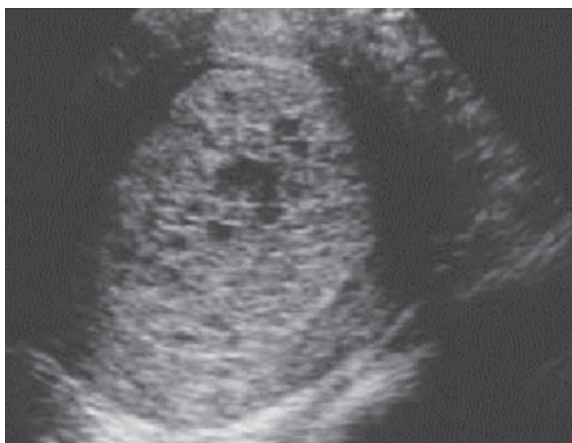




**Figure 4.18**  
Subchorionic hemorrhage. The anechoic fluid separating the gestational sac from the myometrium is clearly seen. These patients should pursue formal consultation because they are at a higher risk of hemorrhage and miscarriage.



**Figure 4.19**  
Large, irregularly shaped gestational sac. Because no yolk sac or fetal pole is seen, this is likely embryonic resorption and a missed abortion. However, pseudogestational sac of ectopic pregnancy cannot be ruled out on this image alone, and proper consultation should be obtained.

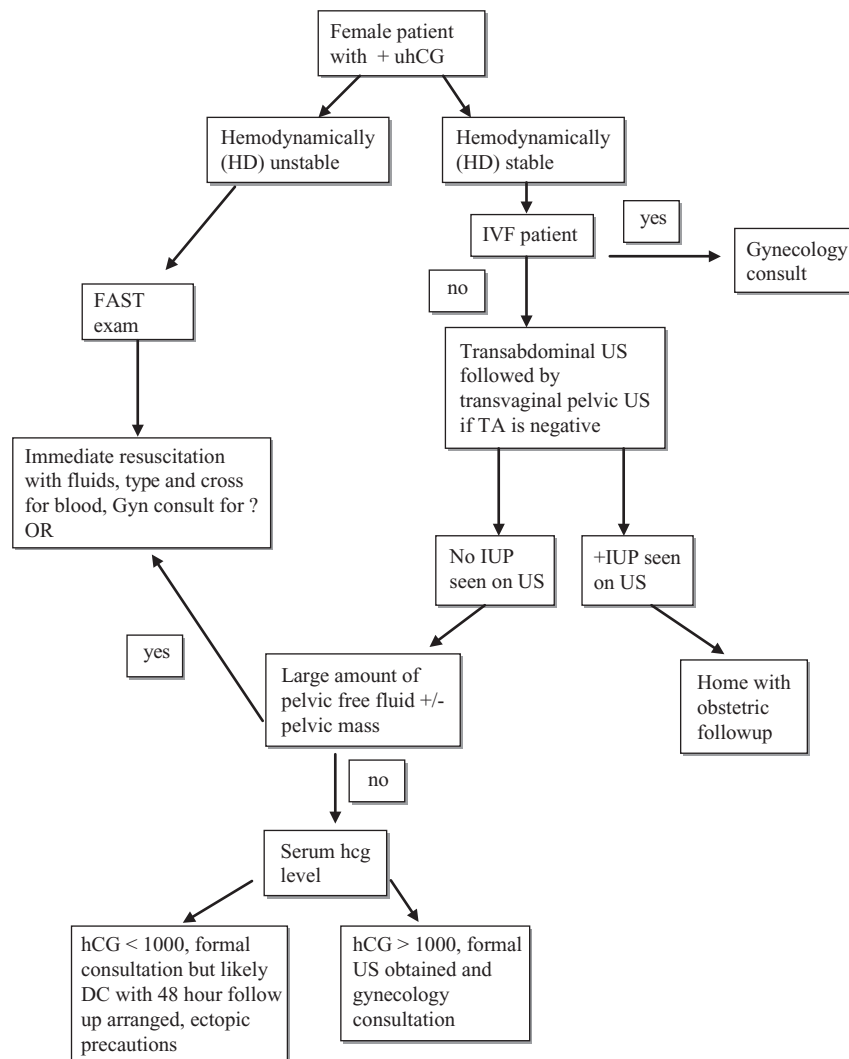


**Figure 4.20**  
Molar pregnancy. The large uterus appears filled with heterogenous material in the form of hundreds of tiny follicles. Because a significant number of such patients have high hCG levels and undergo malignant transformation of this tissue, they should pursue formal consultation.

## Sample Clinical Protocol

Algorithms using transvaginal sonography and a beta-hCG discriminatory zone have been developed to improve diagnostic accuracy and clinical consistency. There are several variations of this algorithm, although the recommendations are generally similar (1–3,12).

The protocol below (Figure 4.21) describes a typical algorithm incorporating several key decision point (pelvic ultrasound, Rh type, hCG level, etc.) into a care plan for patients with possible ectopic pregnancy.



**Figure 4.21**  
Sample Clinical Protocol.



## Literature Review

Reference	Methods	Results	Notes
Blaivas et al. (14)	Retrospective chart review of 1,419 ED patients undergoing US for r/o ectopic.	For patients with IUP, length of stay 21% (daytime) to 28% (evening) shorter when EPs perform US vs. radiology.	Time saving with EP-performed bedside US.
Burgher et al. (20)	Retrospective review of 84 patients undergoing evaluation for ectopic pregnancy by EPs and ob/gyn.	Shorter length of stay, no missed ectopics in group evaluated by EPs.	Time saving with EP-performed bedside US, low risk of missed ectopic.
Durston et al. (16)	Retrospective study evaluating test ordering practices after introduction of EP-performed pelvic sonography.	Specificity of EP-performed sonography ruling in IUP was 95%. Increased availability of US improves quality of ectopic pregnancy detection at expense of number of US done.	Proposed that EP physicians screen all patients with first trimester cramping or bleeding and immediately refer for formal study all indeterminate scans for best results.

## New Directions

As emergency physicians have become more proficient with first trimester scanning, new protocols have been proposed to address the large number of patients with indeterminate scans who are clinically and hemodynamically stable. Patients with indeterminate first trimester scans have three possible outcomes: (1) the pregnancy is too early and is below the discriminatory zone level for ultrasound detection, (2) the pregnancy is an ectopic pregnancy, or (3) the pregnancy is a missed or incomplete abortion (18). Often, patients with indeterminate scans and hemodynamic stability are sent home to be followed up in 48 hours for a repeat serum quantitative hCG level to assess the viability of the pregnancy.

Tayal et al. (21) proposed an algorithm that would decrease the number of patients that require formal gynecology consultation before discharge in the indeterminate ultrasound group. They suggested that patients with indeterminate bedside ultrasound scans who (1) have no adnexal tenderness, (2) have no pelvic free fluid seen on US, (3) are hemodynamically stable, and (4) have an hCG level <1,500 are safe for discharge without gynecology consultation but with a plan for follow-up in 48 hours for repeat evaluation.

**Table 4.1** Discriminatory zone findings on transabdominal (TA) and transvaginal (TV) scanning

	TA	TV	hCG level
Gestational sac	5.5–6 weeks	4.5–5 weeks	1,700–6,000
Yolk sac	6–0.5 weeks	5–5.5 weeks	8,000–15,000
Fetal pole	7 weeks	5.5–6 weeks	13,000–15,000
Cardiac activity	7 weeks	6 weeks	16,000–25,000
Fetal parts	>8 weeks	8 weeks	29,000–39,000

Although this is not recommended for departments that are new to bedside scanning, this protocol further highlights the progress of ultrasound. As technology becomes more routine and techniques are mastered, the diagnostic envelope continues to be pushed forward.

## References

1. Reardon RF, Martel ML. First trimester pregnancy. In Ma OJ, Mateer JR (eds), *Emergency Ultrasound*. New York: McGraw-Hill; 2003:239–76.
2. Moore C, Promes SB. Ultrasound in pregnancy. In Rosen CL, Wolfe RE (eds), *Emergency Medicine Clinics of North America – Ultrasound in Emergency Medicine* Saunders, Philadelphia. 2004:697–722.
3. Lyons E, Levi C, Dashefsky S. The first trimester. In Rumack C, Wilson S, Carboneau J (eds), *Diagnostic Ultrasound*. Vol 2. St. Louis: Mosby-Year Book; 1998:978–1011.
4. Richards SR, Stempel LE, Carlton BD. Heterotopic pregnancy: reappraisal of incidence. *Am J Obstet Gynecol* 1982;142:928–30.
5. Reece EA, Petrie RH, Sirmans MF, et al. Combined intrauterine and extrauterine gestations: a review. *Am J Obstet Gynecol* 1983;146:323–30.
6. Bright DA, Gaupp FB. Heterotopic pregnancy: a reevaluation. *J Am Board Fam Pract* 1990;3:125–8.
7. Gamberoella F, Marrs R. Heterotopic pregnancy associated with assisted reproductive technology. *Am J Obstet Gynecol* 1999;160:1520–3.
8. Dart RG, Kaplan B, Cox C. Transvaginal ultrasound in patients with low beta-human chorionic gonadotropin values: how often is the study diagnostic? *Ann Emerg Med* 197;30(2):135–40.
9. Chambers SE, Muir BB, Haddad NG. Ultrasound evaluation of ectopic pregnancy including correlation with human chorionic gonadotropin levels. *Br J Radiol* 1990;63(748):246–50.
10. DiMarchi JM, Kosasa TS, Hale RW. What is the significance of the human chorionic gonadotropin value in ectopic pregnancy? *Obstet Gynecol* 1989; 74(6):851–5.
11. Kadar N, Bohrer M. The discriminatory human chorionic gonadotropin

- zone for endovaginal sonography: a prospective randomized study. *Fertil Steril* 1994;61(6):1016–20.
12. Gracia CR, Barnhart KT. Diagnosing ectopic pregnancy: decision analysis comparing six strategies. *Obstet Gynecol* 2001;97(3):464–70.
  13. Yeh H-C, Goodman JD, Carr L, et al. Intradecidual sign: ultrasound criteria of early pregnancy. *Radiology* 1986;161:463–7.
  14. Blaivas M, Sierzenski P, Plecque D, et al. Do emergency physicians save time when locating a live intrauterine pregnancy with bedside ultrasonography? *Acad Emerg Med* 2000;7(9):988–93.
  15. Brennan DF. Diagnosis of ectopic pregnancy. *J Fla Med Assoc* 1997;84(9):549–56.
  16. Durston WE. Ultrasound availability in the evaluation of ectopic pregnancy in the ED: comparison of quality and cost-effectiveness with different approaches. *Am J Emerg Med* 2000;18(4):408–17.
  17. Kaplan BC, Dart RG, Moskos M, et al. Ectopic pregnancy: prospective study with improved diagnostic accuracy. *Ann Emerg Med* 1996;28:10–17.
  18. Tayal VS, Cohen H, Norton HJ. Outcome of patients with an indeterminate emergency department first trimester pelvic ultrasound to rule out ectopic pregnancy. *Acad Emerg Med* 2004;11(9):912–17.
  19. Stovall TG, Kellerman AL, Ling FW, Buster JE. Emergency department diagnosis of ectopic pregnancy. *Ann Emerg Med* 1990;19:1098–103.
  20. Burgher SW, Tandy TK, Dawdy MR. Transvaginal ultrasonography by emergency physicians decreases patient time in the emergency department. *Acad Emerg Med* 1998;5(8):802–7.
  21. Tayal VS, Forgash AJ, Norton HJ. Outcomes for ectopic pregnancy patients with indeterminate pelvic ultrasounds using a modified CMC pregnancy ultrasound protocol with selective non-IUP gynecologic consultation. *Ann Emerg Med* 2006;48(4):S105.