Ectopic Pregnancy

Ectopic pregnancy is the implantation of the conceptus outside of the endometrial cavity. It is also known as extraterine pregnancy. The most common site of an ectopic implantation is the fallopian tube. Incidence rates are given on the adjacent chart. Sonography probably is the most important tool in diagnosing ectopic pregnancy. Most commonly, it is used to confirm the presence of an intrauterine pregnancy in patient with discriminatory levels of serum ß-hCG. Visualization of an intrauterine sac, particularly with identification of embryonic cardiac activity, often is adequate to exclude ectopic pregnancy. The exception to this is in the case of heterotopic pregnancies, which occur from 1 in 4,000 to 1 in 30,000 spontaneous pregnancies. Examining the adnexae with sonography is mandatory despite visualization of an intrauterine pregnancy in patients undergoing ovarian stimulation and assisted reproduction because they have a 10-fold increased risk of heterotopic pregnancy. The adnexa should also be examined carefully if an intrauterine pregnancy is not identified.

- ADNEXAL PREGNANCY: May occur in any portion of the fallopian tube or ovary. Sites in the tube include; isthmic, ampullary, fimbrial, or interstitial portions. Ovarian implantations (which are rare) include; tubo-ovarian or abdomino-ovarian.

- UTERINE ECTOPIC PREGNANCY: When the conceptus implants on any site within the uterus outside the endometrial cavity, an ectopic pregnancy exists. Implantation sites can include; corneal, in a uterine sacculation, intramural, or cervical.

<table>
<thead>
<tr>
<th>Occurrence rate of locations of ectopic pregnancies</th>
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<tr>
<td>Fallopian tube - ampullary</td>
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<tr>
<td>Fallopian tube - isthmic</td>
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<td>Fimbria</td>
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<td>Cornual/interstitial</td>
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<td>Abdominal</td>
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<td>Ovarian/cervical</td>
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CERVICAL ECTOPIC: A rare occurrence (1:16,000). Risk factors include previous uterine curettage. Cervical ectopics carry high morbidity and mortality rates and attempts to evacuate the uterus can cause massive hemorrhage. Total hysterectomy may be required if methotrexate treatment fails.

ABDOMINAL PREGNANCY: Rarely, a conceptus may leave the pelvis and implant anywhere in the peritoneum. The pregnancy usually continues to develop as long as the perfusional needs of the gestation are met. In the author’s personal experience, the oddest location of an ectopic pregnancy was the undersurface of the gallbladder.

HETEROTOPIC PREGNANCY: Heterotopic pregnancy is the coexistence of an intra- and an extrauterine pregnancy. The incidence of this condition has increased in countries with advanced infertility care. In Europe and the United States, this condition occurs in one of 2,600 pregnancies. With fertility treatments, the incidence of heterotopic pregnancy increases to as high as 3 percent. Heterotopic pregnancy is extremely difficult to diagnose, and 50 percent of cases are identified only after tubal rupture. If retention of the intrauterine gestation is desired, the ectopic pregnancy must be treated surgically.

RISK FACTORS
- Pelvic inflammatory disease.
- History or prior ectopic pregnancy.
- Prior tubal surgery, including tubal ligation.
- Use of fertility drugs or assisted reproductive technology.
- Use of IUDs.
- Increasing age.
- Cigarette smoking.
CLINICAL FINDINGS: no specific findings are diagnostic for ectopic pregnancy. Common signs that should cause suspicion include:

- **Positive pregnancy test.**
- Abnormal rate of rise of serum hCG levels as expected for dates.
- Palpation of an adnexal mass (in the presence of a positive serum hCG is highly suspicious).
- Pelvic pain or bleeding within 1 - 8 weeks following the first missed menstrual period.
- Leukocytosis or slight fever.
- Pain referred to the shoulder caused by intraperitoneal hemorrhage.

SONOGRAPHIC FINDINGS:

- **Identification of an extrauterine GS with yolk sac is pathognomonic for ectopic pregnancy**
- Empty uterus. An intrauterine GS should be identified with EV sonography when the serum hCG levels reach 800 - 1000 mIU/ml (2IS).
- Presence of an adnexal mass.
- Free fluid in the cul-de-sac, adnexae or pericolic gutters.
- Statistically, a viable gestation implanted normally within the endometrial cavity excludes ectopic. There is a 1 in 30,000 chance of concomitant intra and extra uterine implantations (heterotopic pregnancy) in a normal population. There is a 1 in 2,600 chance in patients undergoing ovulation induction).
- Presence of an endometrial decidual reaction.
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PITFALLS:

• Presence of endometrial fluid "pseudogestational sac." Absence of the double sac sign eliminates this pitfall.
• Misidentification of a corpus luteum cyst as an adnexal ectopic.

SONOGRAPHIC FINDINGS (ABDOMINAL ECTOPIC)

• Absence of myometrium surrounding the pregnancy.
• Poor visualization of placenta.
• Usually diagnosed later in gestation.
• Presence of an empty uterus separate from the developed fetus.
• Oligohydramnios.
• Unusual fetal presentation.

SONOGRAPHIC FINDINGS (CERVICAL ECTOPIC)

• Identification of intact gestational sac in cervical canal.
• Empty uterus.
SONOGRAPHIC FINDINGS IN ECTOPIC PREGNANCY

Intact ectopic in the left adnexa.

Endometrial decidual reaction.

Large quantity of blood and fluid in anterior & posterior cul de sac. (Ruptured).

Endovaginal demonstration of blood and fluid on the posterior cul de sac.

Solid mass, fluid collection in left adnexa. (blue arrows)

Spectral Doppler demonstration of cardiovascular activity in intact ectopic.
Color Doppler imaging has been demonstrated to improve the diagnostic sensitivity and specificity of transvaginal US, especially in cases where a gestational sac is questionable or absent. A study of 304 patients at high risk for ectopic pregnancy found that the use of color-flow Doppler US, compared with transvaginal US alone, increases the diagnostic sensitivity from 71-87% for ectopic pregnancy, from 24-59% for failed intrauterine pregnancy, and from 90-99% for viable intrauterine pregnancy.

**DIAGNOSIS (DOPPLER CRITERIA)**
- “Ring of fire” surrounding gestational sac.
- Presence of high velocity, low-resistance spectral waveform indicated typical trophoblastic flow patterns, but this may be mimicked by flow at the margins of a corpus luteum cyst.

**OTHER DIAGNOSTIC PROCEDURES**
While sonography has become the primary diagnostic modality in examining patient with suspected ectopic pregnancy, it can fail. When sonographic findings are inconclusive, other diagnostic procedures may be performed. They include:
- **Culdocentesis**: may reveal free blood in the cul-de-sac.
- **Laparoscopy**: allows for direct visualization and analysis of adnexal and intra-abdominal masses.
- **Exploratory laparotomy**: is used less frequently but allows for a definitive diagnosis.