

Ectopic Pregnancy Management: Tubal and interstitial

SIGNS / SYMPTOMS

Pain and vaginal bleeding are the hallmark symptoms of ectopic pregnancy. Pain is almost universal; it is generally lower abdominal and unilateral. Bleeding is also very common following a short period of amenorrhea. Physical exam may reveal a tender adnexal mass, often mentioned in texts, but noted clinically only 20 percent of the time. Furthermore, it may easily be confused with a tender corpus luteum of a normal intrauterine pregnancy. Finally signs and symptoms of hemoperitoneum and shock can occur, including a distended, silent, "doughy" abdomen, shoulder pain, bulging cul de sac into the posterior fornix of the vagina, and hypotension.

DIAGNOSIS

Initially, serum hCG rises, but then usually plateaus or falls. Transvaginal ultrasound scanning is a key diagnostic tool and can rapidly make these diagnoses:

1. Ectopic is ruled out by the presence of an intrauterine pregnancy with the exception of rare heterotopic pregnancy
2. Ectopic is proven when a gestational sac and an embryo with a heartbeat is seen outside of the uterus
3. Ectopic is highly likely if ANY adnexal mass distinct from the corpus luteum or a significant amount of free pelvic fluid is seen.

When ultrasound is not definitive, correlation of serum hCG levels is important. If the hCG is above the "discriminatory zone" of 3000 mIU/ml IRP, a gestational sac should be visible on transvaginal ultrasound.

The discriminatory zone varies by ultrasound machine and sonographer. If an intrauterine gestational sac is not visible by the time the hCG is at, or above, this threshold, the pregnancy has a high likelihood of being ectopic. When serum hCG is less than 3000 mIU/ml, and ultrasound findings are unclear serial quantitative hCG levels in combination with follow-up imaging are most useful.

Repeat serum hCG should be drawn in 48 hours. With 99% sensitivity in early pregnancy, an increase in serum hCG of less than 53% in 48 hours confirms an abnormal pregnancy (Barnhart 2004)

In some cases of ectopic pregnancy, a small fluid collection within the uterus can be mistaken for a true gestational sac. However, this pseudogestational sac lacks a surrounding echogenic ring of chorionic villi, a yolk sac or fetal pole. An unruptured corpus luteum cyst or may be mistaken for an ectopic gestational sac, and a ruptured corpus luteum cyst may produce free pelvic fluid suggesting ruptured ectopic pregnancy. The presence of ANY cul-de-sac fluid indicates ectopic pregnancy until proven otherwise.

When hCG levels are not rising normally and ultrasound cannot confirm pregnancy location, a dilation and curettage (D&C) or manual vacuum aspiration (MVA) may yield chorionic villi or a gestational sac 38 percent of the time. When this happens a failed intrauterine pregnancy is diagnosed and treatment for an ectopic pregnancy avoided. When suspicion for ectopic

pregnancy is high but cannot be confirmed with noninvasive testing, laparoscopy can both confirm the diagnosis and accomplish treatment.

Pregnancy of unknown location

When a pregnant patient with pain and/or bleeding has an US, particularly a transabdominal ultrasound (TAUS), that has no findings (ie, no IUP, adnexal mass, or echogenic fluid), the differential diagnosis is normal early IUP, nonviable IUP, or ectopic pregnancy. Approximately 15 to 26 percent of women with ectopic pregnancy will have a "normal" initial US.

In a hemodynamically stable patient, an US with no findings should be repeated when the human chorionic gonadotropin (hCG) reaches the discriminatory zone for endometrial findings or in three to four days, since the gestational sac of an IUP grows approximately 1 mm per day and is visible on US when it reaches 3 mm or greater. In 11 to 16 percent of cases with an indeterminate initial scan, ectopic pregnancy is evident on follow-up US

-Pelvic ultrasonography is the most useful imaging modality for women with pregnancy of unknown location. (Jurkovic 2010)

-Approximately 15 to 26 percent of women with ectopic pregnancy will have an initial US with no findings. The serum human chorionic gonadotropin above which a singleton gestational sac should be visualized on ultrasound examination is 3000 IU/L with transvaginal. US

-Sonographic identification of an intrauterine gestational sac is suggestive, but not diagnostic, of an intrauterine pregnancy. An endometrial pseudosac can be seen in up to 20 percent of women with an ectopic pregnancy.

-The presence of a yolk sac or an embryo within the endometrium is diagnostic of an intrauterine pregnancy.

-Adnexal findings that are suggestive, but not diagnostic, of a tubal pregnancy are a "tubal ring" or a noncystic adnexal mass. Sonographic confirmation of a tubal pregnancy is made when an extrauterine sac with a yolk sac and/or embryo is visualized

-Echogenic peritoneal free fluid almost always represents hemoperitoneum. The presence or absence of peritoneal free fluid is not a reliable indicator of whether an ectopic pregnancy has ruptured.

Terminology

'Indeterminate' is a term used in clinical practice that has led to confusion. Some practitioners have used the term to mean 'pregnancy of indeterminate site' while others mean 'pregnancy of indeterminate viability'. The term 'indeterminate' should no longer be used, and should be replaced with the two separate terms below.

Both terms should only be used after assessment by TVS.

'Pregnancy of unknown location': No signs of either intra- or extrauterine pregnancy or retained products of conception in a woman with a positive pregnancy test.

Pregnancy of 'uncertain viability': Intrauterine sac (16-24 mm mean diameter) with no obvious fetus; crown-rump length <7 mm with no obvious fetal heart activity. In order to confirm or refute viability, a repeat scan at a minimal interval of 11 days is necessary.

Findings diagnostic of Pregnancy Failure by Transvaginal Ultrasound

- CRL \geq 7mm with no fetal cardiac motion
- Mean sac diameter \geq 25 mm and no embryo
- Absence of embryo with fetal cardiac motion \geq 2 wks after a scan that showed a gestational sac without a yolk sac
- Absence of embryo with fetal cardiac motion \geq 11 days after a scan that showed a gestational sac with a yolk sac

Management:

1.) Ectopic Pregnancy

With early diagnosis the management of ectopic pregnancy has firmly moved into the outpatient realm. Current treatment options favor medical and laparoscopic management with expectant management reserved for cases with a declining quantitative hCG $<$ 1,000 and open surgical management limited to cases of tubal rupture and hemoperitoneum.

Surgical management via laparoscopy or open laparotomy can involve complete removal of the fallopian tube (salpingectomy) or efforts to remove the ectopic pregnancy and conserve the tube (salpingostomy). In the presence of a healthy contralateral tube there is no clear evidence that salpingotomy should be used in preference to salpingectomy. (Silva 1993) Laparoscopic salpingotomy should be considered as the primary treatment when managing tubal pregnancy in the presence of contralateral tubal disease and the desire for future fertility. (RCOG 2004)

In comparing systemic methotrexate with tube-sparing laparoscopic surgery, randomized trials have shown no difference in overall tubal preservation, tubal patency, repeat ectopic pregnancy, or future pregnancies. (ACOG 2008)

Ectopic pregnancies located in the tubal cornua, interstitial area or uterine cervix are difficult to treat. Table 1 shows indications for surgical management. (See Section 2)

Table 1.

Indications for Surgical Management of Ectopic Pregnancy

- Unstable vital signs or signs of hemoperitoneum
- Uncertain diagnosis
- Advanced ectopic pregnancy (high hCG, large mass, cardiac activity)
- Unreliable follow-up
- Any contraindication to observation or methotrexate

Expectant or medical treatment are options in hemodynamically stable women who are carefully selected and informed according to the criteria in Tables 2 and 3. Expectant management is an option for clinically stable asymptomatic women with an ultrasound diagnosis of ectopic pregnancy and a decreasing serum hCG, initially less than serum 1000 IU/l. (RCOG 2004)

Human chorionic gonadotropin level is the best predictor of successful treatment with methotrexate. A systematic review of several studies showed that failures with single dose methotrexate occurred 3.7 percent of the time when hCG levels were below 5,000 mIU/ml vs. 14.3 percent when higher than this cut-off.

The failure rate for women who had an initial concentration between 5000 and 9999 mIU/mL was significantly higher than for those who had initial levels between 2000 and 4999 mIU/mL (OR 3.8, 95% CI 1.2-12.3). (Menon 2007) Thus, single methotrexate use is used only in special circumstances when hCG levels exceed 5,000 mIU/ml. (Menon 2007) If hCG levels are higher than 5,000 mIU/mL, then multiple doses may be appropriate (Alleyassin 2006).

Table 2.

Criteria for Expectant Management Include:

- Minimal pain or bleeding
- Patient reliable for follow-up
- No evidence for tubal rupture
- Starting hCG level less than 1000 mIU/ml and falling
- Ectopic or adnexal mass less than three centimeters, or not detected
- No embryonic heartbeat

Table 3.

Criteria for Medical Management of Ectopic Pregnancy With Methotrexate

- Stable vital signs and low level of symptomatology
- No medical contraindication for methotrexate therapy
(normal liver enzymes, creatinine, complete blood count and platelet count)
- Unruptured ectopic pregnancy
- Ectopic mass four centimeters or less
- Starting hCG levels less than 5000 (If 5-10K mIU/ml – Multidose)
- Absence of embryonic cardiac activity (If present - Multidose)
- Willing to stay in an area with surgical backup until HCG is negative

Expectant management is used most often when the actual location of the pregnancy cannot be determined. If the initial hCG level is less than 200 mU/mL, 88% of patients experience spontaneous resolution. (Korhonen 1994)

Medical management with methotrexate, a folic acid antagonist, is appropriate for properly selected patients and has been shown in randomized trials to be safe and effective; it also can be less costly and result in equal or better subsequent fertility than conservative surgical treatment. As with expectant treatment, patient selection and close follow-up are key to safety and success. Single dosage intramuscular regimens are commonly calculated at one mg/kg or 50 mg/m². The dose is rounded up to the nearest 5 mg.

Body surface area (BSA) may be calculated based upon height and weight on the day of treatment using the formula $BSA = \text{square root} ((\text{cm} \times \text{kg})/3600)$ or a BSA calculator:
http://www.uptodate.com/contents/calculator-body-surface-area-mosteller-square-root-method?source=see_link&utdPopup=true

Guidelines for single and multiple dose regimens are shown in Table 4.

Serum hCG testing is performed on the fourth and seventh post-treatment days and then followed weekly until the level reaches 5 mIU/ml, which may take three to four weeks. The hCG initially rises slightly, but should fall 15 percent between days four and seven; if not, the dosage should be repeated or surgical therapy performed. The methotrexate dosage should be repeated no more than once before surgical consultation is obtained. Because some patients

managed expectantly or with methotrexate will eventually require surgery, prompt consultation is essential for the non-surgeon.

During therapy the patient should be advised:

- Avoid coitus
- Avoid ETOH
- No Folic Acid or folic acid containing vitamins, e. g., prenatal vitamins
- Pain frequently develops on the 2nd to 7th day after therapy (consider non-NSAIDs)
- Blood type and Rh should be known in all patients prior to therapy
- Avoid pelvic exams during surveillance of MTX therapy due to theoretical risk of tubal rupture
- Avoid sun exposure to limit risk of MTX dermatitis
- Avoid nonsteroidal antiinflammatory drugs, as the interaction with MTX may cause bone marrow suppression, aplastic anemia, or gastrointestinal toxicity
- A birth control method is recommended for at least 3 months post therapy.
- Stay in an area with surgical backup until HCG is negative

Consider the possibility of heterotopic gestation, in women who have utilized assisted reproductive technologies such as in vitro fertilization or gamete intrafallopian transfer. (Dimitry 1990) For women who have conceived naturally, the presence of an intrauterine pregnancy makes the likelihood of ectopic pregnancy extremely rare as the incidence of heterotopic gestation has been reported to be between 1 in 4,000 and 1 in 8,000.

2.) Interstitial pregnancy: Management

Initially treat interstitial pregnancy (located at the junction of the fallopian tube and uterine cavity) with multidose medical therapy if medically stable (Table 4) resorting to surgical therapy if there is any deterioration in clinical status. (Stovall 1989) There are no high quality data comparing single versus multidose MTX therapy for interstitial pregnancy.

Table 4.
Single and Multiple Dose Methotrexate Regimens for Treatment of Ectopic Pregnancy

<i>Treatment</i>	<i>Single Dose</i>	<i>Multidose</i>
Pretreatment, rule out spontaneous abortion	hCG, creatinine, liver function, CBC w/diff blood type and Rh	hCG, creatinine, liver function, CBC w/diff blood type and Rh
Day #1	Check hCG value, Administer first dose of MTX 50 mg/m ² IM	Check hCG value, Administer first dose of MTX 1 mg/kg IM Followed by Leucovorin 0.1 mg/kg IM on Day 2 Check hCG on day 2
Day #4	Check hCG value	Administer second dose of MTX (day 3) and Leucovorin (day 4) on and respectively. Check hCG on day 4
Day #7	Check hCG value for 15 % decrease between days 4 and 7.	Continue administering doses of MTX and Leucovorin (i.e. course 3 day 5 and 6 and

	<p>If > 15 % fall, check hCG weekly until not detectable in serum.</p> <p>If < 15 % fall, administer second dose MTX, 50 mg/m²IM</p>	<p>course 4 day 7 and 8) until hCG values have declined by 15 %. Do not exceed 4 courses</p> <p>If > 15 % decline, check hCG weekly until not detectable in serum.</p>
Weekly surveillance	If follow-up hCG value till zero plateau or rise, consider surgical intervention or repeat dose of MTX as additional therapy.	If follow-up hCG value till zero plateau or rise, consider surgical intervention or repeat dose of MTX as additional therapy.

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