

Ectopic pregnancy: a pictorial review

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Abstract

Ultrasound has remained the primary modality for investigating the pelvis of women in the reproductive age group, especially in an emergency setting. Recognition of different sonographic presentations, including typical and atypical findings of ectopic pregnancy, is important to determine surgical or nonsurgical management. This pictorial review article will exemplify different sonographic presentations of ectopic pregnancy.

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1. Introduction

Ultrasound remains the modality of choice for the diagnosis of ectopic pregnancy. An ectopic pregnancy occurs when the conceptus implants and matures outside the endometrial cavity. Recognition of the classic presentations of various types of ectopic pregnancies and their complications by ultrasound, and differentiation from other entities that may mimic ectopic pregnancy are crucial to early diagnosis and clinical management. While ultrasound alone may be sufficient at times to arrive at the diagnosis of ectopic pregnancy, it is complemented with serum B human chorionic gonadotropin (B-hCG) levels. Additional critical factors that influence clinical management, such as anatomic location, viability, and rupture, are best diagnosed by ultrasound.

2. Incidence

There is a 2% incidence of ectopic implantation occurring in all pregnancies. It results in 10% of all pregnancy-related deaths [1] and is the leading cause of fertilized ovum implants in the fallopian tube. The common sites of

implantation are the isthmus (55%), the fimbria (17%), the abdomen, ovary, and cervix (3%) [2]. Teenagers of African-American and other minority races have a higher incidence of ectopic pregnancies [1].

3. Risk factors

There are several well-known factors that are associated with risk of ectopic pregnancy. Pelvic inflammatory disease is the leading cause of ectopic pregnancy. A history of previous ectopic gestation increases the risk of future ectopic pregnancy by 10–25%. After tubal ligation or tubal surgery, there is a 35–50% incidence of ectopic pregnancy in patients. The advent of ovulation induction and in vitro fertilization has increased the risk of ectopic pregnancy by fourfold. The presence of intrauterine devices and advancing maternal age contribute to ectopic pregnancy, with the highest incidence seen in the 35- to 44-year-old group. Smoking has also been attributed as an etiological factor.

4. Clinical presentation

The classic clinical presentation is that of abdominal or pelvic pain with amenorrhea. Vaginal bleeding is present in approximately 50% of patients.

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5. Differential diagnosis

Other etiologies of acute pelvic pain with negative B-hCG results include ruptured corpus luteal or hemorrhagic ovarian cyst with hemoperitoneum, ovarian torsion, or tubo-ovarian abscesses. Correlation with B-hCG is critical in establishing the presence or the absence of an ectopic pregnancy. If the result is negative, a live ectopic pregnancy is virtually excluded. Serum levels become positive at approximately 23 days of menstrual age, prior to identification of a gestational sac by ultrasound. B-hCG in ectopic pregnancy tends to be lower and rises more slowly than in a normal intrauterine pregnancy (IUP) where the normal doubling time is approximately 2 days. B-hCG threshold levels of 500–1000 mIU/ml Systeme International d'unités (SI) have been proposed for endovaginal ultrasound. With a β of <500, only 20% of sacs will be seen; with a β of 500–1000, 80% of sacs will be seen. If the β is >1000, up to 100% of sacs should be recognized; if the B-hCG is above the threshold level without a gestational sac, it is presumed to be an ectopic pregnancy. Endovaginal scanning is the best way to establish or exclude the diagnosis of an ectopic pregnancy.

6. Ultrasound findings

Ultrasound findings include the presence of an extrauterine gestational sac (Fig. 1), a yolk sac (Fig. 2A) or a fetal pole (Fig. 2A), fetal cardiac activity (Fig. 2B), an adnexal or tubal ring (Fig. 3), or an adnexal mass (Fig. 4). Free fluid may be seen in up to 25% of patients with ectopic pregnancy. The presence of echogenic free fluid correlates with the presence of ectopic pregnancy in those patients with clinical suspicion of ectopic pregnancy (Fig. 5A and B). Echogenic fluid also correlates with the presence of hemoperitoneum at surgery [3,4]. A pseudo gestational sac (Fig. 6A) is an intrauterine fluid collection that must be distinguished from



Fig. 1. Extrauterine gestational sac: longitudinal transabdominal image of the pelvis shows the presence of an ectopic pregnancy with a gestational sac and a fetal pole in the posterior cul-de-sac. UT, uterus; GS, gestational sac.

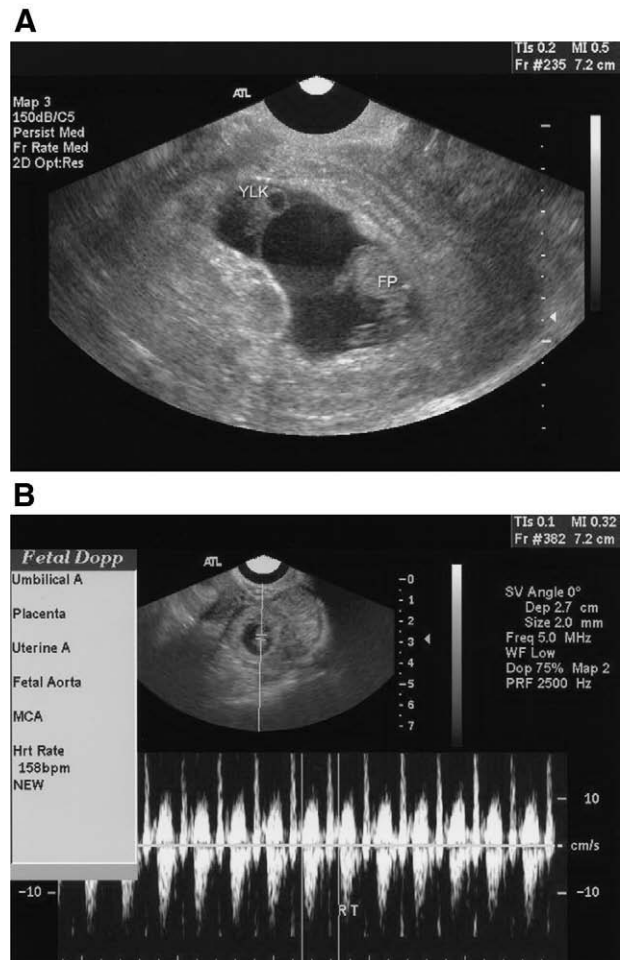


Fig. 2. (A) Yolk sac: a yolk sac and a fetal pole are identified within an extrauterine gestational sac in the posterior cul-de-sac. YLK, yolk sac; FP, fetal pole. (B) Cardiac activity: fetal pole with cardiac activity present within a right adnexal ectopic pregnancy.

the gestational sac of a normal early IUP. This can be identified in 20% of patients with ectopic pregnancy. The pseudo sac is usually ovoid and central in location, unlike a normal early IUP, which has well-defined margins. The pseudo sac has only a single-decidual layer, while in an early IUP, there are two concentric layers comprising the double-decidual sac—the sign of a normal early IUP [5].

7. Tubal ring sign

An extrauterine gestational sac (Fig. 1) can present as an extrauterine mass with a thick brightly echogenic ring surrounding a central anechoic area. It may contain a yolk sac, a fetal pole, or both. The usual location is between the uterus and the ovary. An ipsilateral (Fig. 7) or contralateral corpus luteal cyst may be seen in up to one third of cases. Color flow Doppler may aid in identification. A tubal ring is an echogenic ring-like structure outside the uterus that is highly vascular, created by the trophoblast of the ectopic pregnancy surrounding the gestational sac (Fig. 3). The tubal ring is found

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