

CASE REPORT

Early ultrasonographic diagnosis of unruptured interstitial pregnancy: a case report and review of the literature

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Summary

Interstitial ectopic pregnancy occurs when the fertilized ovum implants in the interstitial portion of the fallopian tube, where it transverses the wall of the uterus from the cornua to the corner of the uterine cavity. Interstitial ectopic pregnancy is an infrequent type of ectopic pregnancy, occurring in 2% to 4% of all tubal pregnancies. It is a life-threatening condition because myometrium rupture tends to occur in the second trimester of pregnancy resulting in profuse bleeding. This paper concerns the ultrasonographic diagnosis of a 33-year-old, gravida 4, para 3 woman with unruptured interstitial pregnancy, diagnosed in the 7th week of pregnancy. Awareness and suspicion of such pregnancy are required for its early detection. A combination of the sensitive β -hCG assays, a single serum progesterone measurement and transvaginal ultrasonography are the principle tools used to make the diagnosis. The diagnostic difficulties are also discussed.

Key words: Ectopic pregnancy; Ultrasound examination; Diagnosis; Interstitial pregnancy.

Introduction

Ectopic pregnancy is defined as the implantation of a fertilized ovum outside the uterine cavity. Tubal ectopic pregnancy can be ampullary, isthmic, fimbrial or in the interstitial portion of the tube (interstitial ectopic pregnancy). These sites account for 95% of ectopic pregnancies [1]. Other rare types of ectopic pregnancy include ovarian [2], abdominal, cervical, vaginal and intraligamentous ectopic pregnancy [1]. Ectopic pregnancy in a rudimentary uterine horn [1] and heterotopic pregnancy (a combination of intrauterine and an ectopic pregnancy) [1, 3], have also been reported.

Ectopic pregnancy in humans occurs in 16 per 1,000 reported pregnancies [4]. Approximately 2% to 4% of all tubal pregnancies are interstitial pregnancies [4] and occur within the interstitial portion of the fallopian tube, where it traverses the wall of the uterus from the cornua to the corner of the uterine cavity [5].

Before the 19th century, ectopic pregnancy was thought to be universally fatal; however, the overall mortality rate has since decreased dramatically from 72% to 90% in 1880 to 0.14% in 1990 [6]. In contrast, the maternal mortality rate of interstitial pregnancies is still 2% to 2.5% [4]. This higher likelihood of fatal exsanguination of an interstitial pregnancy is due to the ability of the myometrium to distend more readily than the fallopian tubes, resulting in rupture at a later date and in catastrophic haemorrhage due to involvement of the uterine artery and its major branches as the gestational sac grows [5, 7].

Early diagnosis is more difficult for interstitial pregnancy than the other types of tubal implantation, but it

is desirable to diagnose this condition prior to rupture in order to reduce mortality [8]. The correct diagnosis requires awareness and suspicion of this condition. The purpose of this study is to present the sonographic findings of an unruptured interstitial pregnancy diagnosed in the first trimester of pregnancy and to discuss the diagnostic difficulties.

Case report

A 33-year-old, gravida 4, para 3 woman presented at the Outpatient Obstetrics Clinic of the Department of Obstetrics and Gynaecology, "G. Chatzikosta" General State Hospital of Ioannina, after having amenorrhea for some weeks. The first date of her last menstrual bleeding was six weeks before. The patient had no history of inflammatory diseases within the lower abdomen or any other chronic disorders. No contraceptive method had been used. There was no history of induced or spontaneous abortions. The first menstrual bleeding occurred at the age of 13. Menstrual cycles were regular, every 26 to 28 days and lasted for four to six days. The patient had an operation of open cholecystectomy. When presented to the Outpatient Obstetrics Clinic the urine pregnancy test was positive; transvaginal sonography revealed a normal uterus and no intrauterine gestational sac was observed. Both ovaries were normal. Therefore the patient went home and was instructed to come back a week later. A transverse ultrasound scan obtained seven days later demonstrated the gestational sac containing the fetus towards the left. The bulk of the uterus was to the right (Figure 1). At the same time, transvaginal ultrasound examination revealed an eccentrically located gestational sac surrounded by a thin myometrial layer and a separate empty uterine cavity with endometrial echoes (Figures 2-4). The fetus had positive cardiac activity (Figure 5) and a crown-rump length of 10.4 mm corresponding to a gestational age of seven weeks (Figure 3). This ultrasonographic picture was suggestive of a left interstitial pregnancy.

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The patient did not complain of abdominal pain. The cervix was closed and no blood or clots were observed in the vagina. Pelvic examination revealed a normally shaped, non-tender, anteverted uterus approximately "seven weeks" in size. The adnexa and cul-de-sac were normal. On auscultation of the abdomen, there was normal peristalsis. The patient's blood pressure was 100/70 mmHg and her heart rate was 65 beats per minute. Other physical findings were unremarkable. Haematocrit was 37.6%, haemoglobin 12.7 g/dl, white blood count $6.8 \times 10^3/\mu\text{l}$, with 52% polymorphonuclear leukocytes. Urinalysis was normal. A quantitative serum β -hCG level was reported as 20,100 mIU/ml. The levels of serum progesterone were 34.94 nmol/l (or 10.99 ng/ml). Finally, an operation by laparotomy was performed and an unruptured left interstitial pregnancy was verified. A unilateral swelling in the left cornual area of the uterus with the left fallopian tube at the left side of the mass and the round ligament protruding laterally to the mass was revealed. The color of this area was slightly cyanotic with an irregular margin. This gestational swelling was minimally softer than

the right side of the uterus (Figures 6-8). Cornual resection was performed. The surgical specimen showed the gestational sac situated in the interstitial portion of the left tube (Figure 9). Figure 10 demonstrates the uterus after the closure of the resection site. The postoperative course of the patient was uneventful. Haematoxylin and eosin histological section showed chorionic villi and myometrium, which were consistent with the diagnosis of interstitial pregnancy (Figure 11).

Discussion

Interstitial pregnancy occurs when the fertilized ovum implants in the interstitial part of the fallopian tube, which is the tubal segment that penetrates the uterine wall [9]. An interstitial pregnancy should be distinguished from an angular and a cornual pregnancy, which clearly follow different clinical courses. An angular pregnancy occurs when an embryo is implanted medial to the utero-

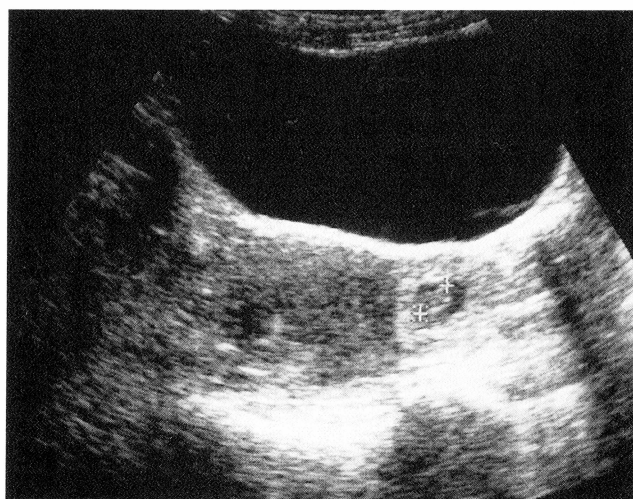


Fig. 1



Fig. 2

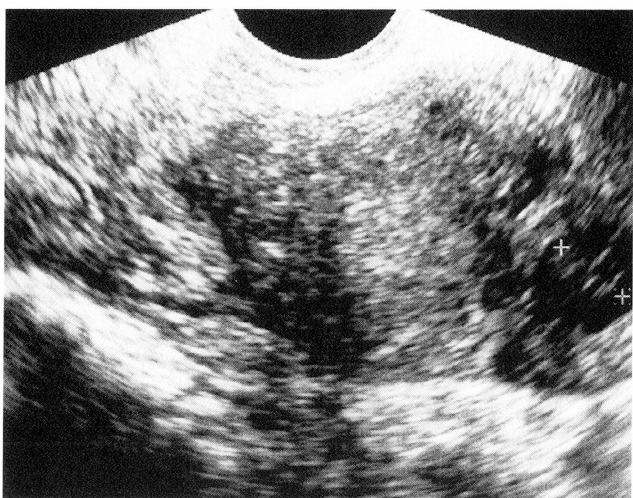


Fig. 3



Fig. 4

Figure 1. — Transverse ultrasound scan demonstrating the gestational sac containing the fetus toward the left.

Figure 2. — Transvaginal scan demonstrating an eccentrically located gestational sac surrounded by a thin myometrial layer. No gestational sac in the uterine cavity was revealed.

Figure 3. — The crown-rump length of the fetus was 10.4 mm corresponding to the 7th gestational week.

Figure 4. — Missing myometrial mantle in the interstitial pregnancy in the position where the left fallopian tube inserted into the uterus (arrow).

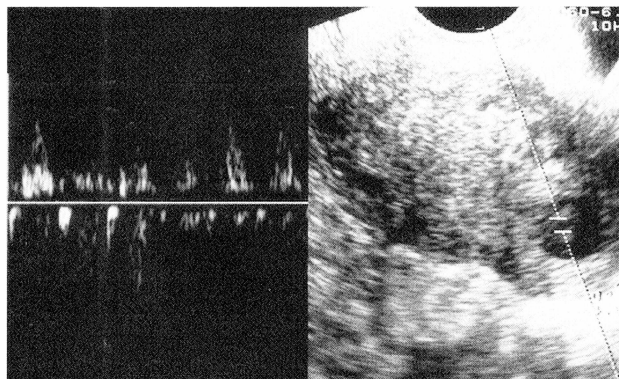


Figure 5. — Demonstration of positive cardiac activity of the fetus.

tubal junction in the lateral angle of the uterine cavity, close to the internal ostium of the fallopian tube [4]. In an interstitial pregnancy, when looking at the posterior view of the uterus, the gestational swelling is seen lateral to the round ligament, while in an angular pregnancy it is seen medial to the round ligament as the gestation displaces the round ligament reflexion upward and outward [4]. A cornual pregnancy occurs when the embryo is implanted in the horn of a bicornuate uterus or in the rudimentary horn or in the lateral half of a septated or partially septated uterus [4]. In an interstitial pregnancy the myometrial layer surrounding the interstitial portion of the tube allows the gestation to expand and protects it from rupture until 7-16 weeks of gestation [4]. Women with an interstitial pregnancy are two to five times likely to present in shock, as are those with a tubal ectopic pregnancy [10]. In angular pregnancy miscarriage occurs in 39% of the cases. The risk of rupture in angular pregnancy is considered rare, while in cornual pregnancy the risk depends on the expansive capability of the uterus at the implantation site [4].

The diagnosis of interstitial ectopic pregnancy frequently can be made prior to rupture if there is a high level of suspicion combined with careful pelvic and ultrasound examinations [11]. The predisposing factors for interstitial pregnancy are similar to those for ectopic pregnancy in general. The factors commonly associated with interstitial pregnancy include pelvic inflammatory disease, endometriosis, previous pelvic surgery, tumor, uterine anomalies, use of assisted reproductive technology and ipsilateral salpingectomy [4, 7]. Identification of risk factors is important for the suspicion of such complication of pregnancy, although in the case described above no risk factors were found. Transvaginal sonography allows detection of an ectopic pregnancy one week earlier than the abdominal route. Transvaginal sonography can now identify an intrauterine sac, on average, at a serum β -hCG concentration of 1,398 mIU/ml [12], whereas previously a threshold level of 6,500 mIU/ml was used in conjunction with transabdominal ultrasonography. The standard protocol utilizing serum beta human chorionic gonadotropin (β -hCG) (1,500 mIU/ml) as a discriminatory cut-off in the absence of an intrauterine pregnancy

on transvaginal ultrasound has a sensitivity of 100% and a specificity of 99% [13, 14]. Doubling times of 1.2 to 1.4 days have been observed in normal pregnancies when β -hCG concentrations were examined in the late luteal phase and the first week after the expected menses [15, 16], while the higher estimates of 3.3 to 3.5 days were derived during the sixth to eighth week after the previous menses [16-18]. According to Pittaway [19], three different patterns of β -hCG concentration may be observed in tubal pregnancies. Initially, the increase of β -hCG is normal for a significant proportion of ectopic pregnancies. The second pattern is one of increasing β -hCG at an abnormal rate, which means less than 66% increase in β -hCG concentration within a two-day interval [17, 19]. The third pattern is a decreasing β -hCG concentration, indicating a nonviable pregnancy [16, 19]. In addition to β -hCG levels a single serum progesterone measurement can indicate an abnormal gestation [16]. It appears that serum progesterone levels of less than 15 ng/ml are associated with abnormal gestation [16]. These levels do not reveal the location of the pregnancy, but reveal that further β -hCG and ultrasound evaluation is needed [16]. Hubinont et al [20] have reported 89% specificity and 65% sensitivity for the detection of an ectopic pregnancy when a cut-off value of 15 ng/ml was used. Also, a value between 15 and 25 ng/ml might indicate a 10% incidence of ectopic pregnancy, whereas a progesterone level above 25 ng/ml has a 97% chance of indicating normal pregnancy [21]. In the presented case the levels of serum progesterone of 10.99 ng/ml (or 34.94 nmol/l) indicated the presence of an abnormal gestation.

The diagnosis of interstitial pregnancy is frequently delayed for two reasons. First, the uterus may appear appropriately enlarged without asymmetry and the tubes and ovaries will feel normal on examination [9]. Second, because this segment of the uterus grows with the enlarging gestation and rupture usually occurs later than with the more common tubal pregnancy [9]. Real time ultrasonography in the diagnosis of ectopic pregnancy is most helpful in excluding ectopic pregnancy by revealing a normal intrauterine pregnancy. However, an ultrasonogram demonstrating an intrauterine pregnancy does not rule out an ectopic pregnancy because of the possibility of heterotopic pregnancy [3, 9]. The sonographic criteria for the diagnosis of an interstitial pregnancy are the following: (a) gestational sac outside the uterine cavity, (b) gestational sac in close proximity to the uterus, (c) separate empty uterine cavity with crescent-shaped endometrial echoes, (d) lack of a complete myometrial mantle around the gestational sac, (e) eccentric location of the sac in relation to the remainder of the uterus [5]. In interstitial pregnancy the incomplete myometrial mantle seen in ultrasonographic examination represents the insertion of the fallopian tube to the uterus. In contrast, in a normal intrauterine gestation there should be a uniform rim of solid tissue representing the myometrial mantle around the gestational sac [5]. An eccentrically located gestational sac is not specific for the diagnosis of an interstitial pregnancy because a gestation in one horn of a bicornuate



Fig. 6

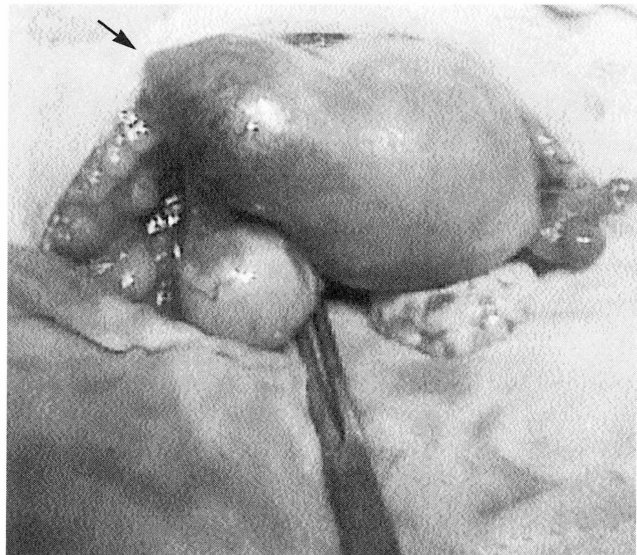


Fig. 7



Fig. 8



Fig. 9



Fig. 10

Figure 6. — Left interstitial pregnancy: unilateral swelling in the left cornual area of the uterus with a slight cyanotic cast.

Figure 7. — The left fallopian tube protrudes from the left side of the mass (arrow).

Figure 8. — The round ligament protrudes laterally to the interstitial pregnancy (arrow).

Figure 9. — Surgical specimen showing the gestational sac situated in the interstitial portion of the left fallopian tube.

Figure 10. — The uterus after closure of the resection site on the left.

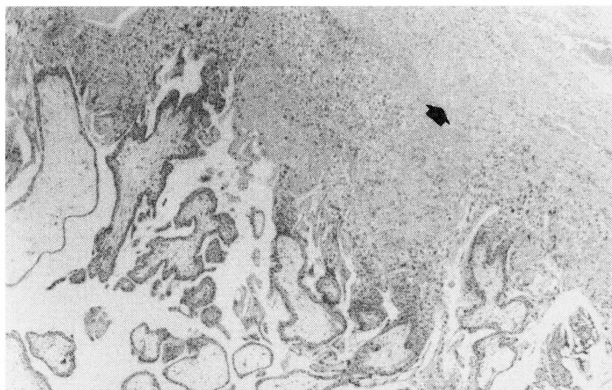


Figure 11. — Chorionic villi and myometrium (arrow) are consistent with the diagnosis of interstitial pregnancy (H&E x 40).

uterus or a myoma in the wall of the uterus may yield a similar appearance. In such cases the myometrial mantle should be indentified completely surrounding the sac [5]. In the case we present a transverse scan obtained seven days later demonstrated the gestational sac containing the fetus towards the left. The bulk of the uterus was to the right (Figure 1). Transvaginal ultrasound examination revealed an eccentrically located gestational sac in close proximity to the uterus and a separate empty uterine cavity with crescent-shaped endometrial echoes (Figures 2-5). The gestational sac was surrounded by a thin myometrial layer, which was missing in the region representing the insertion of the tube to the uterus (Figure 4). The fetus had positive cardiac activity (Figure 5) and a crown-rump length of 10.4 mm corresponding to a gestational age of seven weeks (Figure 3). This ultrasonographic picture was suggestive of a left interstitial pregnancy. When there is a doubt about the ultrasonographic diagnosis of an interstitial pregnancy diagnostic laparoscopy should be very helpful.

In conclusion, diagnosis of interstitial pregnancy prior to rupture is possible when there is a high level of suspicion combined with careful ultrasound examination. Early diagnosis of interstitial pregnancy is important for the prevention of fatalities.

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