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Case Report

Interstitial ectopic pregnancy: A more confident diagnosis with three-dimensional sonography

Tzu-Yi Lin ^{a, b}, Ho-Yen Chueh ^{a, b}, Shuenn-Dyh Chang ^{a, b}, Chung-Yuan Yang ^{a, b, *}^a College of Medicine, Chang Gung University, Taoyuan, Taiwan^b Department of Obstetrics and Gynecology, Linkou Chang Gung Memorial Hospital, Taoyuan, Taiwan

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ABSTRACT

Objective: To present a confident tool for the diagnosis of interstitial ectopic pregnancy. 3-Dimensional US helps to reach a more proper diagnosis and enables to arrange therapeutic and surgical strategies. **Case report:** A 36-year-old, gravida 4 para 2, woman was referred from the local medical department in the suspicion of ectopic pregnancy. Transabdominal ultrasound revealed an empty uterine cavity but an 8-week-old gestational sac located eccentrically on the right side of the uterine fundus. The Three-dimensional sonography (3D US) demonstrated a gestational sac (GS) over the right cornual region separated from the endometrial cavity. Interstitial pregnancy was impressed. Laparoscopic surgery was then arranged. After entering the pelvic cavity, a bulging mass was found over the utero-tubal junction, compatible with interstitial pregnancy. The wedge resection of interstitial ectopic pregnancy and right salpingectomy were undertaken. The patient was discharged within 2 days after the surgery.

Conclusion: The conventional sonography still remained the primary tool to diagnose the ectopic pregnancy, but 3D US played an indispensable role in demonstrating the precise location of GS. Interstitial ectopic pregnancy was symptomatically late in gestation and rupture of an interstitial pregnancy causes catastrophic consequence due to massive bleeding, so prompt and accurate diagnosis was definitely life-saving. Appropriate therapy or surgical intervention could be arranged.

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Introduction

Ectopic pregnancy accounts for approximately 2% of all pregnancies [1]. And interstitial ectopic pregnancy has been reported in 2.4% of all ectopic pregnancies [2]. In all kinds of tubal pregnancy, interstitial ectopic pregnancy is relatively rare but much more life-threatening. The mortality rate was 2%–2.5%, which was extremely higher than of overall, 0.14%, respectively [3]. Furthermore, interstitial gestation has late symptoms on about 12 weeks, so the diagnosis may be delayed or missed [4]. Due to the gestational sac always locating on the special utero-tubal junction distributed by abundant vessels, rupture of an interstitial pregnancy could cause catastrophic hemorrhage. Conclusively, a convenient and immediate modality to diagnose is essential to interstitial ectopic pregnancy.

First of all, in the evaluation of patients with a positive serum human chorionic gonadotropin (hCG) test over 1500 mIU/mL, ectopic pregnancy should be ruled in the suspicion [5]. Conventional gynecological ultrasound whether transvaginal or transabdominal approach, remains primary tool. The sign of interstitial line is a diagnostic finding of high sensitivity in interstitial ectopic pregnancy [6]. Three-dimensional sonography could facilitate the confirmation of the relationship of GS and uterus. In addition, the reconstruction and rendering of the sonographic image can produce additional views which differentiate interstitial ectopic pregnancy with other similar disease [7]. Through this case, the importance of this confident diagnostic tool will be emphasized by the main findings in 3D US.

Case report

A 36-year-old, gravida 4 para 2, woman was referred from local medical department with the suspicion of ectopic pregnancy. The patient's menstruation had been irregular since her last menstrual period was Dec. 30, 2018. And she complained vaginal bleeding

* Corresponding author. Department of Obstetrics and Gynecology, Chang Gung Memorial Hospital, Linkou Medical Center, 5, Fu-Shin Street, Kweishan, Taoyuan, 333, Taiwan.

E-mail address: iroi3838@gmail.com (C.-Y. Yang).

since Feb. 02, 2019. Importantly, the pregnancy test revealed positive. However, no intrauterine pregnancy was found by ultrasound, then she was transferred to our outpatient department.

Through our examination, the transabdominal sonography revealed an empty uterine cavity but an 8-week-old gestational sac located eccentrically on the right side of the uterine fundus. Then, the distinct sign of interstitial line was noticed in the image and the fetal heartbeat was also obtained (Fig. 1). Plus, the Doppler ultrasound illustrated rich blood supply as numerous colorful dots distributed around the site of utero-tubal junction (Fig. 2).

Nevertheless, the blurry border between location of GS and uterus didn't allow the accessibility to reach an exact diagnosis. We then arranged a further 3D ultrasound scan. The 3D US demonstrated a GS in the right cornual region separated from the endometrial cavity (Fig. 3). After the discussion with patient and her husband about the findings of ultrasound sonography, management, and prognosis, they decided to go on a surgical intervention.

Laparoscopic surgery was arranged. After entering the pelvic cavity, a bulging mass was found over the utero-tubal junction (Fig. 4). The wedge resection of interstitial ectopic pregnancy and right salpingectomy were undertaken, however, the endometrial cavity was not entered during the surgery. Eventually, the wound was sutured with multiple layers and the final report of pathology confirmed the interstitial ectopic pregnancy (Fig. 5).

Discussion

Interstitial ectopic pregnancy was referred to the most hazardous type of all ectopic pregnancy, whose mortality has been up to 2%. The GS implanted in the intramural portion covered by the myometrium and proliferated blood vessel near the fallopian tube, therefore, the rupture of GS would cause severe hemorrhage in the abdominal cavity often leading to hypovolemic shock and even death [6,8]. In brief, it is vital to diagnose interstitial ectopic pregnancy accurately with cost-effective methods as soon as possible.

After analyzing symptoms, such as amenorrhea, vaginal bleeding etc., of the patient along with the high level of hCG in serum, utilizing ultrasound sonography with both transabdominal and transvaginal approaches is necessary to investigate the abdominal and pelvic cavity. According to the previous literature, three criteria of diagnosing interstitial ectopic pregnancy proposed in 1992 should be satisfied: (1) an empty uterine cavity, (2) a chorionic sac separately (<1 cm) from the lateral edge of uterine cavity, and (3) a thin (<5 mm) myometrial layer surrounding the chorionic sac [9]. Besides, sign of eccentric location of GS, thinning of surrounding myometrial mantle and interstitial line, an

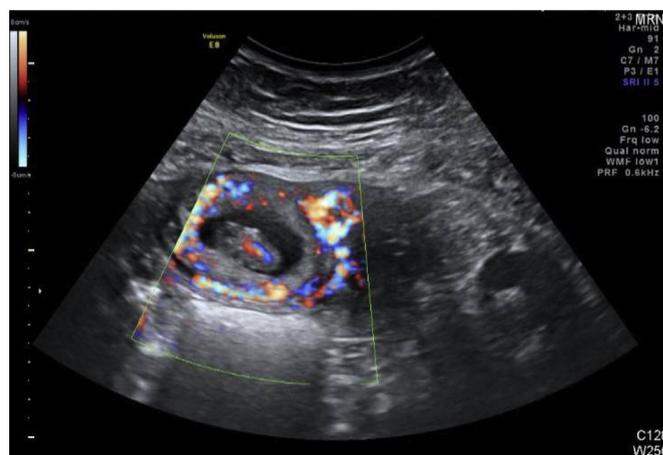


Fig. 2. The 2D Doppler US indicated a colorful vascular ring which had sufficient blood supply.

echogenic line usually appearing in interstitial ectopic pregnancy, play important roles in diagnosis [10]. To be crucial, the “Interstitial line” represents the margin of the intramural GS which extends into the upper region of uterine horn and presents the size and age in either interstitial portion of the endometrium or the tube. And it has high sensitivity (80%) and specificity (98%) in diagnosis of interstitial pregnancy [11].

Nevertheless, in this case, it is still difficult to locate the GS precisely with 2D US. In the previous reference, eccentrically located intrauterine GS has similar eccentric sign and might be misinterpreted as interstitial ectopic pregnancy [8]. Laparoscopic findings can be negative due to the misunderstanding of the 2D US. Then, not every interstitial ectopic pregnancy shows the classic characteristics with conventional ultrasound scan [12]. All in all, locating the GS accurately and distinguishing the interstitial ectopic pregnancy on 2D US would be an obstacle to diagnose.

Moreover, the 2D Doppler transvaginal US, another assessment of higher sensitivity, aided to reveal a thriving vascular ring with rich blood supply. Due to the progressive image, intense peritrophoblastic vascular activity was showed with numerous tortuous vessels [13]. Similarly, interstitial ectopic pregnancy was under a further explanation with 2D Doppler transvaginal US though, the relative position between GS and uterine was still ambiguous.

In order to determine the exact location of GS, 3D US was recommended. The 3D US was capable of reproduce the coronal plane of uterine which produce three perpendicular orthogonal plans [6]. Then the 3D image in the transparency mode was rebuilt and provided a vision of the proximal section of the interstitial tube [14]. In this case, the GS was implanted over the utero-tubal junction that was clearly showed in the multiplanar 3D US image. Besides, this modality made it easier to exclude other confusing ectopic pregnancy, such as angular ectopic pregnancy and cornual ectopic pregnancy, and create more opportunities of planning an appropriate therapeutic proposal as soon as possible [7,10].

Back to this case, based on the high level of hCG in serum, the wedge resection of interstitial ectopic pregnancy and right salpingectomy were undertook rather than the conservative therapy of systemic methotrexate due to the fetus' heartbeats. To be more precisely, the treatment of interstitial ectopic pregnancy was often irreversible and made a huge difference toward the health of patient. Hence, 3D US, an accurate diagnostic armamentarium with higher sensitivity, should be taken into consideration to get a clearer image of the GS in relation to the uterine in a distorted environment.



Fig. 1. An eccentrical GS and interstitial line appeared in 2D US that was in suspicion of interstitial ectopic pregnancy.



Fig. 3. The distinct site of GS which was separated from the endometrial cavity was clearly demonstrated in 3D US.



Fig. 4. Under the laparoscopy, the bulging mass located over the utero-tubal junction.

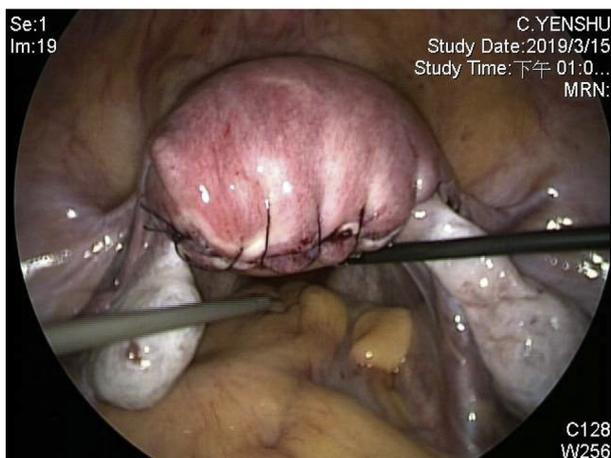


Fig. 5. The wedge resection and right salpingectomy were undertaken by the laparoscopic surgery.

Conclusion

In conclusion, the conventional sonography still remained the primary tool to diagnose the ectopic pregnancy, but 3D US played an indispensable role in demonstrating the precise location of GS. Interstitial ectopic pregnancy was symptomatically late in gestation and rupture of a interstitial pregnancy causes catastrophic consequence due to massive bleeding, so prompt and accurate diagnosis was definitely life-saving. Appropriate therapy or surgical intervention could be arranged.

Author contributions

C.Y. Yang and T.Y. Lin conceived and designed the study; C.Y. Yang acquired the data; T.Y. Lin drafted the manuscript; C.Y. Yang and S.D. Chang revised the manuscript critically for scientific and intellectual content. All authors approved the final version for submission.

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All the authors report no conflict of interest.

Declaration of competing interest

Drs. C.Y. Yang, S.D. Chang, T.Y. Lin and H.Y. Chueh report no conflict of interest.

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