

Just Images: Gynecology

¹Jennifer Lum, ²Mark Hiraoka

ABSTRACT

Diagnostic ultrasound is the primary imaging modality utilized to detect abnormalities of the female reproductive tract. The following cases represent some of the interesting cases imaged at our institution.

Objectives: Interpret ultrasound images of the female reproductive tract. Assimilate the interpretation of sonographic images into a differential diagnosis. Correlate sonographic imaging with clinical outcomes.

Keywords: Cornual ectopic pregnancy, Dermoid, Gestational trophoblastic disease, Intrauterine device, Ovarian torsion, Ultrasound.

How to cite this article: Lum J, Hiraoka M. Just Images: Gynecology. Donald School J Ultrasound Obstet Gynecol 2016;10(1):42-49.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Diagnostic ultrasound is used extensively to image the female reproductive tract. Ultrasound can provide valuable information assisting obstetrician gynecologists diagnose and manage many gynecologic problems they face in clinical practice.

The following series of interesting thought-provoking cases were evaluated with both transabdominal and transvaginal ultrasound at our institution. These images are used to develop differential diagnoses and are later correlated with clinical outcomes.

CASE REPORTS

Case 1

Fifty-year-old gravida 2 para 2002 female who presented with abdominal pain for the past 2 days and heavy menses. She was currently on day 5 of her period and was passing large clots requiring two tampons an hour. Past obstetrical history included one vaginal delivery and

one cesarean section. She had a copper intrauterine device (IUD) placed 4 years ago and denies any history of sexual transmitted diseases. On examination, the uterus was slightly enlarged with active bleeding from the cervical os. The IUD strings were visualized (Figs 1A to E).

What is Your Diagnosis?

- IUD arm perforated into anterior myometrium
- IUD arms not deployed properly
- IUD in lower uterine segment
- IUD not present in uterus
- IUD properly placed in uterus.

Clinical Course

Patient had the IUD removed in the office setting without incident. She declined any further contraception. Her heavy bleeding resolved.

Discussion

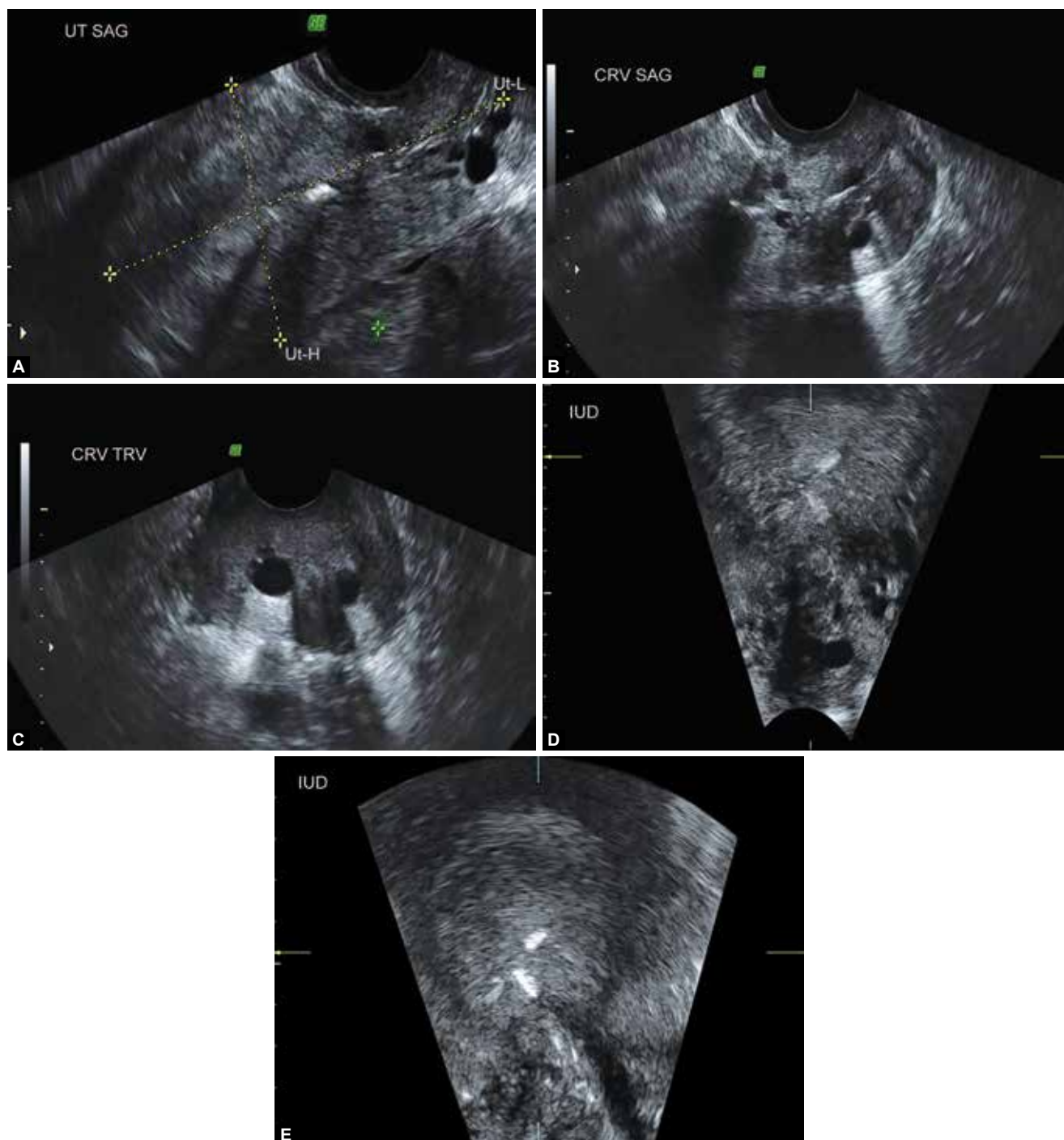
The copper IUD is very echogenic and easily seen on ultrasound. One of the more popular IUDs is the IUD that contains 52 mg of levonorgestrel. It can be difficult to identify because only the proximal and distal ends of the arms produce a detectable echo. A dark sonographic shadow also helps with localization.¹ Three-dimensional ultrasound is often required to determine the relationship between the arms of the IUD and the uterine cavity.² Malposition may be more likely during difficult insertions, such as in patients with a retroverted uterus, adenomyosis or obesity. Approximately 10% of IUD are malpositioned,³ however, not all malpositioned IUD require removal. If the patient reports cramping or abnormal bleeding, then consideration should be given to removing the IUD. Data, although limited, supports keeping the levonorgestrel IUD in place in asymptomatic patients. Pregnancy rates seem to be similar in cases where the levonorgestrel IUD is located in the endocervix when compared to those in located in the fundus.⁴ Unfortunately, data involving malpositioned copper IUDs is limited.

Perforation complicates approximately 1 in 1000 IUD insertions.⁵ Rates are similar for the levonorgestrel IUD and copper IUD. Once perforations are recognized they should be removed unless surgical risks are excessive. Intra-abdominal IUDs are often removed laparoscopically. IUDs that are embedded in the myometrium may require

^{1,2}Assistant Professor

^{1,2}Department of Obstetrics and Gynecology and Women's Health, John A Burns School of Medicine, University of Hawaii Honolulu, Hawaii, USA

Corresponding Author: Mark Hiraoka, Assistant Professor Department of Obstetrics and Gynecology and Women's Health John A Burns School of Medicine, University of Hawaii, Honolulu Hawaii, USA, e-mail: hiraokam@hawaii.edu



Figs 1A to E: Intrauterine device *in utero*

hysteroscopic removal. Prior IUD perforation is not a contraindication to future IUD use; however, placement under ultrasound guidance should be considered.

Case 2

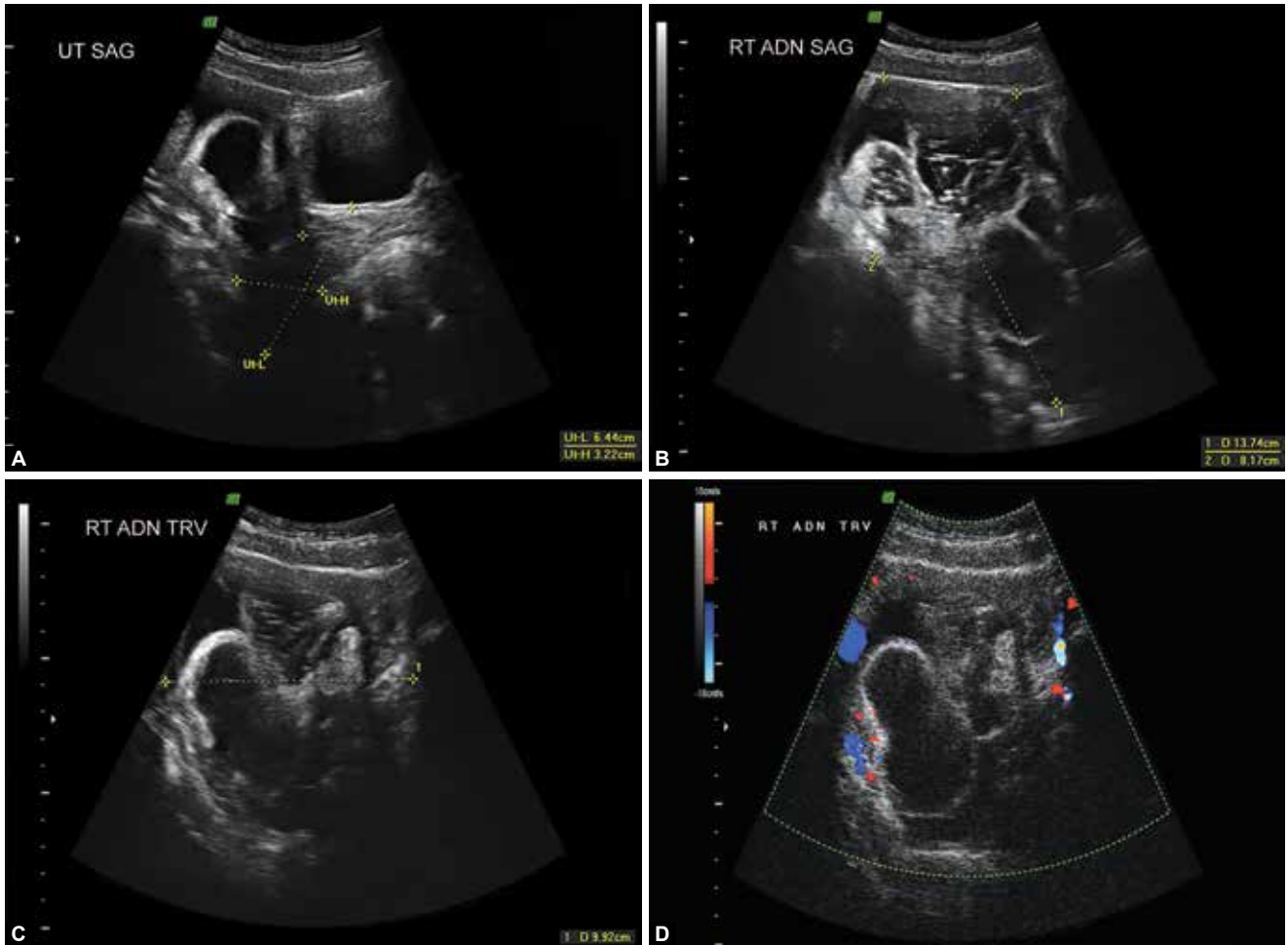
Thirteen-year-old gravida 0 female presented with 1 day of abdominal pain. The pain was intermittent and became progressively worse and constant. She reported nausea and vomiting. She denied fever or chills. She reported menarche at age 11, irregular menses, and denied sexual activity. She was tender to palpation in bilateral lower quadrants with guarding (Figs 2A to D).

What is Your Diagnosis?

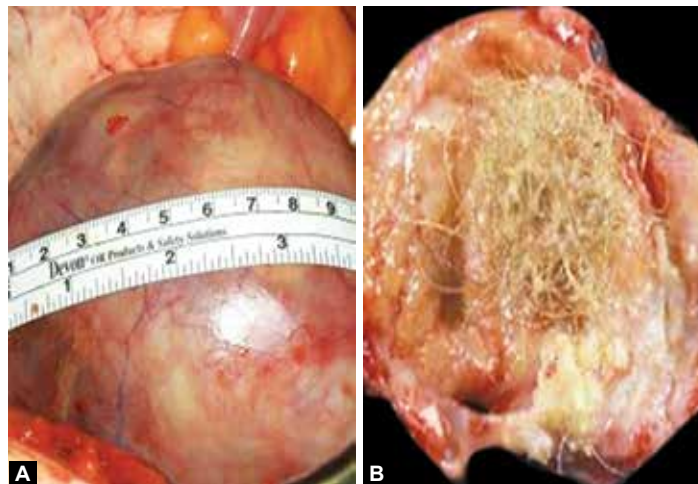
- Dysgerminoma
- Tubo-ovarian abscess
- Borderline mucinous cystadenoma
- Mature cystic teratoma (dermoid)
- Granulosa cell tumor.

Clinical Course

The patient was taken to surgery and underwent an uncomplicated mini-laparotomy with right ovarian cystectomy. Pathology revealed a mature cystic teratoma (Figs 3A and B).



Figs 2A to D: Thirteen-year-old with an ovarian mass



Figs 3A and B: Dermoid cyst

Discussion

Dermoid cysts are also known as mature cystic teratomas. They are benign tumors that contain ectoderm, mesoderm and endoderm. They often contain fat, teeth, bone and hair. The classic sonographic appearance of a dermoid cyst is an echogenic mass with acoustic shadowing. This shadowing can obscure the back wall of the cyst, making it difficult to obtain accurate measurements. The contents

of the cyst (bone, hair, teeth and fat) cause intense echoes. Thin echogenic lines can represent strands of hair. The absence of color flow in the solid areas on Doppler examination is a key characteristic of these lesions.⁶ Dermoid cysts can be mistaken for endometriomas, fibromas and struma ovarii. Surgical removal is the treatment of choice once a dermoid cyst is suspected to prevent complications, such as torsion, rupture or malignant transformation.

Case 3

Forty-seven-year-old gravida 0 female with right lower quadrant pain that she rated 10/10, decreased appetite and some nausea. She previously had a total laparoscopic hysterectomy for fibroids and heavy uterine bleeding. Her right and left ovary were normal at that time. She presented to an outside hospital where a computed tomography (CT) scan and transvaginal ultrasound were both inconclusive. She was given pain medications and sent home.

Pain continued so she had repeat ultrasound at our institution 4 days later (Figs 4A to D).

What is Your Diagnosis?

- Hemorrhagic cyst
- Abscess
- Endometrioma
- Hydrosalpinx
- Ovarian torsion.

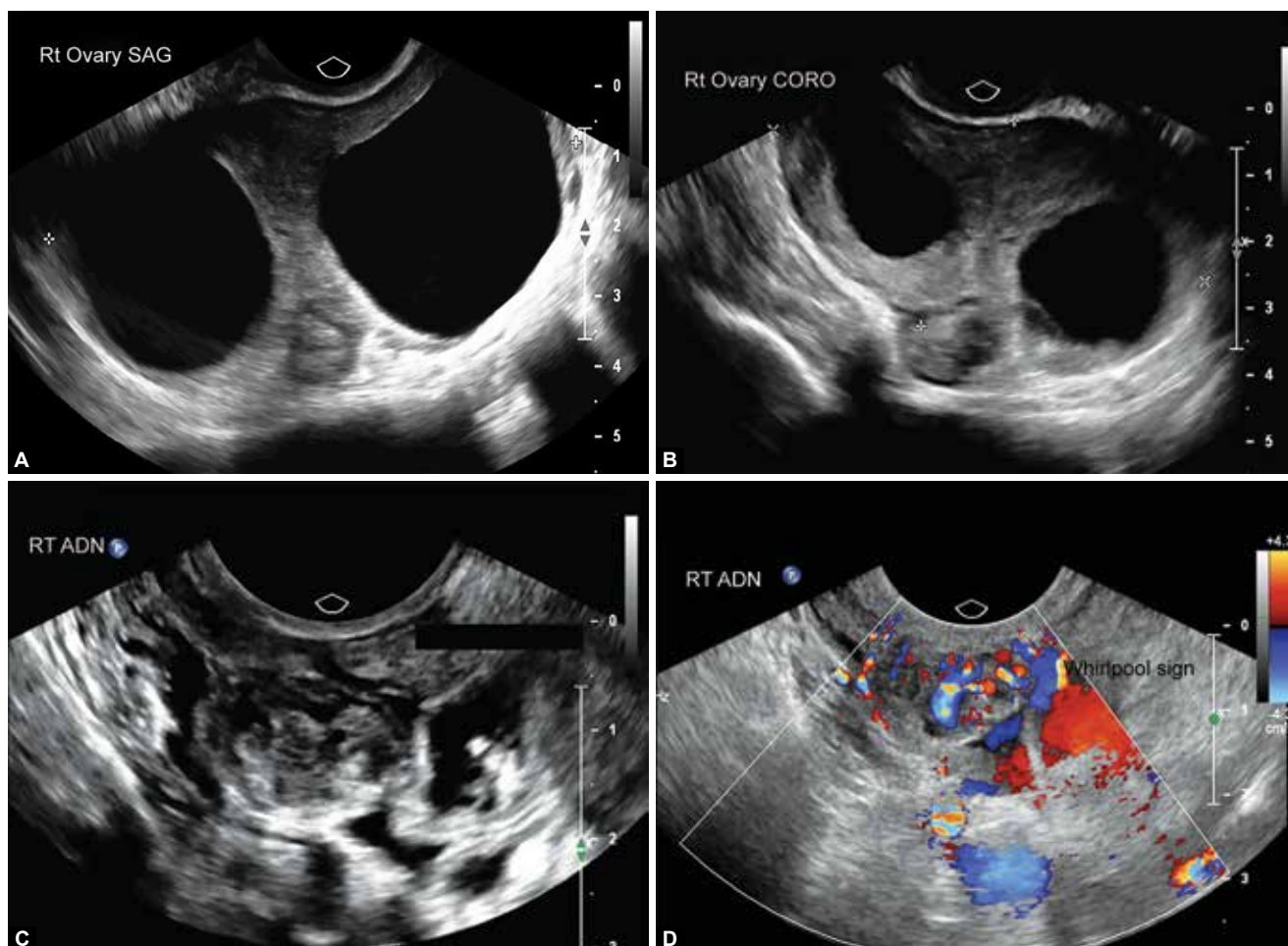
Clinical Course

The patient underwent a laparoscopy which confirmed right ovarian torsion and a right oophorectomy was

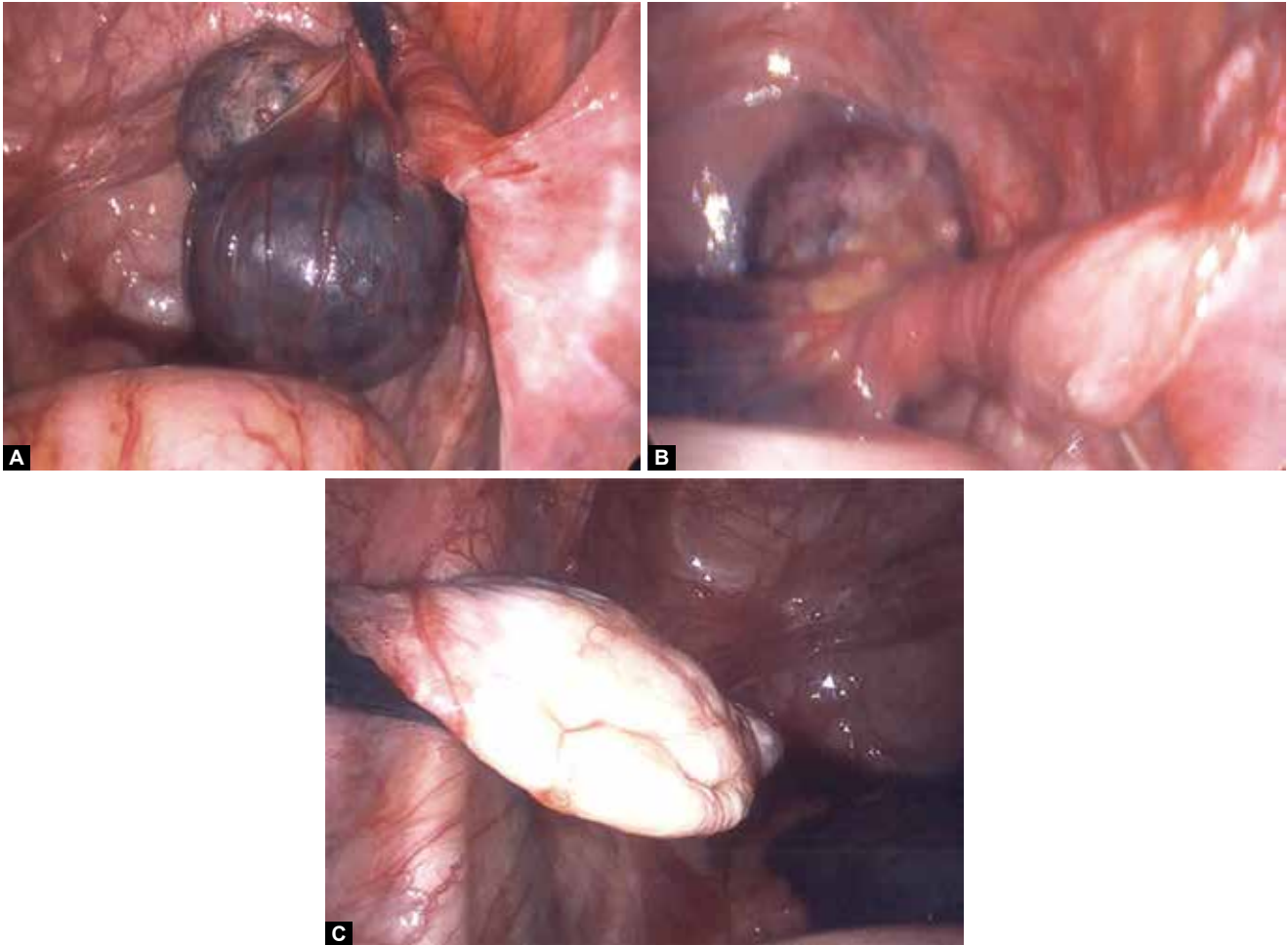
performed without complication. Pathology revealed a benign cyst with hemorrhage consistent with torsion (Figs 5A to C).

Discussion

Ovarian torsion is defined as the twisting by at least one complete turn of the ovary or tube around the infundibulopelvic ligament and tubo-ovarian ligament. This results in decreased blood supply and subsequent ischemia. Delayed diagnosis can lead to irreversible tissue ischemia and eventual loss of the torsed tube or ovary. On ultrasound, a torsed ovary typically is large, edematous with multiple, small follicles along the periphery and ovarian tissue with a heterogeneous echotexture. Often the low pressure venous flow is the first to be eliminated, while higher pressure arterial flow continues to send blood to the ovary and tube. This leads to the enlarged, edematous appearance. Inability to demonstrate blood flow on color Doppler can help with the diagnosis, however, the presence of blood flow cannot be used to confidently rule out torsion. The flow may be intermittent or diminished. Doppler studies may reveal a spiral appearance of the vessels. This is known as



Figs 4A to D: Forty-seven-year-old with right lower quadrant pain



Figs 5A to C: Ovarian torsion on laparoscopy (Case 3)

the ‘whirlpool’ sign and represents the twisted vascular pedicle. The presence of the whirlpool sign has a high positive predictive value for diagnosing torsion.^{7,8}

Management of suspected ovarian torsion is surgical. The decision to proceed with surgical evaluation is based on clinical findings. The goal of surgery is to confirm the diagnosis of torsion and then to evaluate the viability of the ovary and tube. Determining viability is sometimes difficult. Many women (even those with an ovary that is blue or black) retain ovarian function following detorsion.⁹ Therefore, ovarian conservation in premenopausal women is recommended unless there is a high degree of certainty that the ovary is not viable.

Case 4

Thirty-three-year-old gravida 2 para 0010 female presented to our institution with vaginal spotting and a positive home urine pregnancy test. She denied abdominal pain. Her initial beta-human chorionic gonadotropin (beta-hCG) = 5390. An ultrasound was performed (Figs 6A to E).

What is Your Diagnosis?

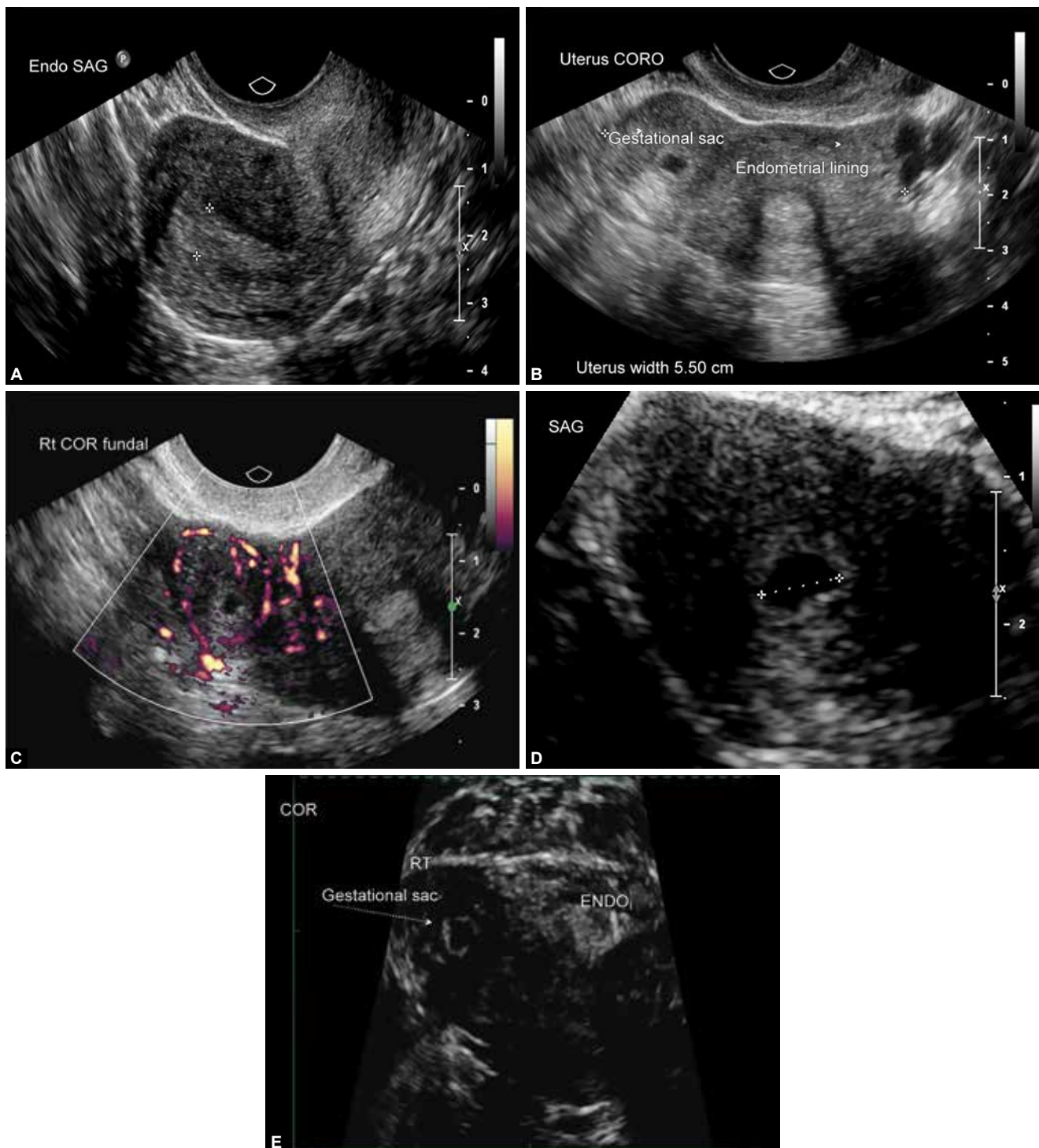
- Normal intrauterine pregnancy
- Tubal ectopic pregnancy—ampullary region
- Tubal ectopic pregnancy—fimbria
- Cornual ectopic pregnancy
- Ovarian ectopic pregnancy.

Clinical Course

The beta-hCG = 6081 2 days later and she received a dose of methotrexate at that time. Four days later the beta-hCG = 5450 and she received another dose of methotrexate. Two weeks later her beta-hCG had dropped to 70 and finally went negative a month later. No surgery was required.

Discussion

Cornual (or interstitial) ectopic pregnancies account for 1 to 3% of all ectopic pregnancies.^{10,11} They are located where the proximal end of the fallopian tube embeds within the myometrium of the uterus. Ultrasound findings consistent with a cornual ectopic pregnancy include a gestational sac is seen clearly outside of the endometrial cavity but still surrounded by a thin



Figs 6A to E: Bleeding in early pregnancy with an unknown location (Case 4)

myometrial layer and the 'interstitial line.' The interstitial line is an echogenic line that extends from the most superior and lateral aspect of the endometrium to the midportion of the interstitial mass or sac.¹²

First line management of cornual pregnancies is usually either single-dose or multi-dose methotrexate. Beta-hCG levels need to be followed carefully per protocol. A residual mass or heterogeneous area with persistent vascularity on ultrasound has been reported despite complete hCG resolution. This finding may take months

to resolve (Fig. 7).¹³ Surgical intervention should be considered in the presence of increased abdominal pain or evidence of intra-abdominal bleeding.

Case 5

Thirty-seven-year-old gravida 6 para 4014 at 6 weeks 5 days gestation by sure LMP presented for her first prenatal visit. She was complaining of persistent nausea and vomiting, but no bleeding or pain. She was noted to have severe hypertension (BP 168/110) but no headache,

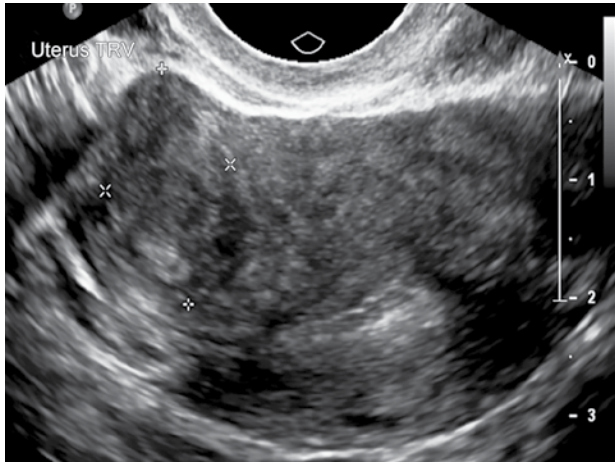


Fig. 7: Two months after initial presentation (Case 4)

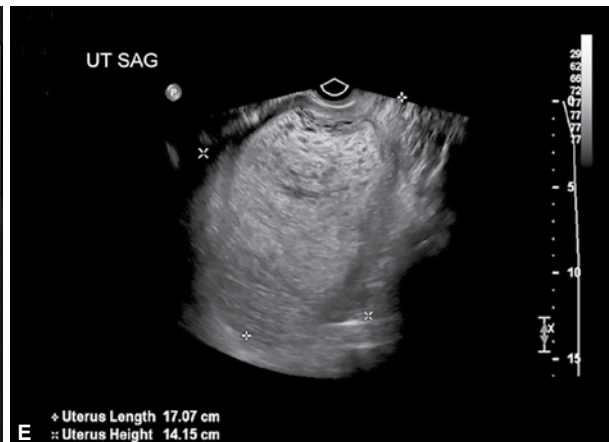
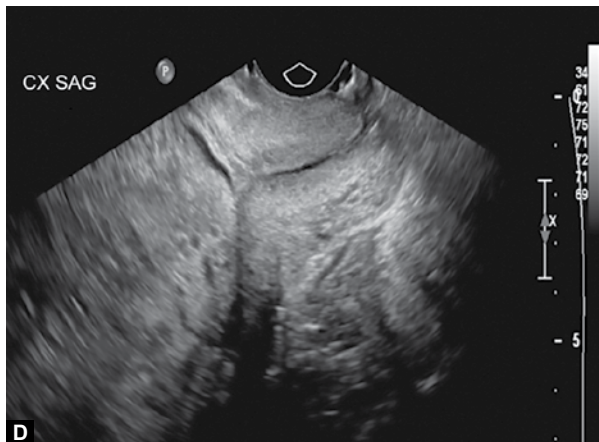
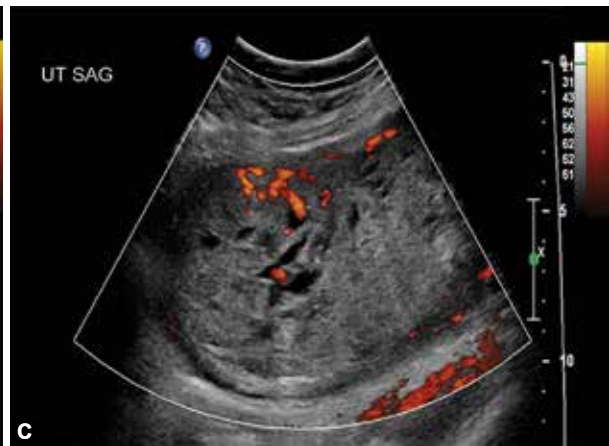
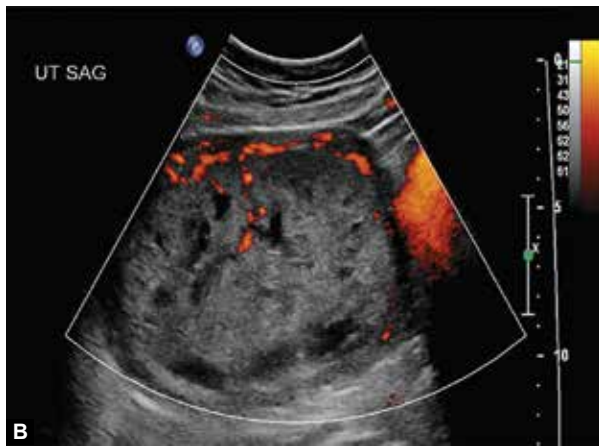
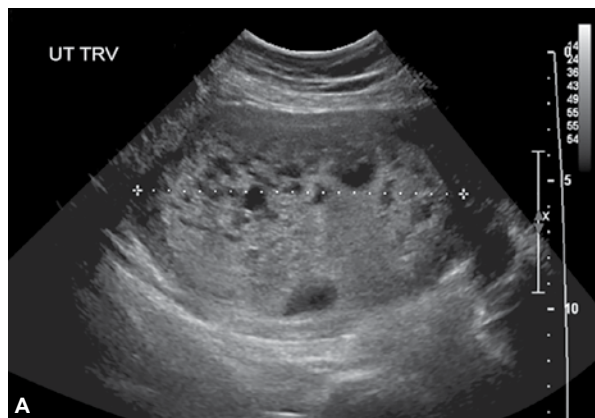
vision changes or right upper quadrant pain. On examination, she had a 20 weeks sized uterus and was then sent for an ultrasound (Figs 8A to E).

What is Your Diagnosis?

- Missed abortion
- Complete molar pregnancy
- Endometrial adenocarcinoma
- Leiomyosarcoma
- Partial molar pregnancy.

Clinical Course

A beta-hCG was drawn and found to be 1,749,150. Hemoglobin = 10.1 and she was Rh positive. A diagnosis



Figs 8A to E: Thirty-seven-year-old with 6 weeks 5 days pregnancy, nausea and vomiting and hypertension (Case 5)



of a molar pregnancy was made. She underwent a suction dilation and curettage without complication. She was placed on contraception and beta-hCG levels were followed to negative. Pathology reveal a complete hydatidiform mole.

Discussion

Hydatidiform mole is an abnormality which is characterized by swollen villi, trophoblastic hyperplasia, and trophoblastic atypia. Complete hydatidiform moles usually contain 46 XX chromosomes, all paternal in origin, with no fetal tissue present. Beta-hCG levels are elevated which can stimulate the formation of ovarian theca lutein cysts. Partial moles have both fetal and abnormal placental tissue present. They are usually triploid due to two sperm fertilizing one ovum. Beta-hCG elevations are not as dramatic as in complete molar pregnancies and partial moles are often diagnosed at the time of miscarriage.

On ultrasound, complete molar pregnancies are characterized by a large complex mass containing cystic spaces intermingled with echogenic tissue within the endometrial cavity ('swiss cheese' or 'snowstorm' pattern). Color Doppler findings usually reveal that the mass is highly vascular. It is more difficult to diagnose partial molar pregnancies with ultrasound. They are often misdiagnosed as an incomplete or missed abortion. A fetus is seen within the gestational sac and the placenta is often thickened with focal cystic spaces ('swiss cheese effect'). The fetus may be abnormal in appearance and is often dead at the time of the ultrasound.¹⁴⁻¹⁶

Management of hydatidiform molar pregnancy is surgical evacuation of the uterine cavity. A suction curettage is recommended. Brisk bleeding can be encountered during and after the procedure, thus preparation for the potential blood loss is advised. Patients are monitored post-evacuation with serial beta-hCG until levels are undetectable for 3 consecutive weeks. Contraception is advised for at least 6 months. Persistent or rising beta-hCG levels usually indicate the development of post-molar gestational trophoblastic disease and is treated by chemotherapy.¹⁷

REFERENCES

1. Palo P. Transabdominal and transvaginal ultrasound detection of levonorgestrel IUD in the uterus. *Acta Obstet Gynecol Scand* 1997 Mar;76(3):244-247.

2. Benacerraf BR, Shipp TD, Bromley B. Three-dimensional ultrasound detection of abnormally intrauterine contraceptive devices which are a source of pelvic pain and abnormal bleeding. *Ultrasound Obstet Gynecol* 2009; 34(1):110-150.
3. Braaten KP, Benson CB, Maurer R, Goldberg AB. Malpositioned intrauterine contraceptive devices: risk factors, outcomes, and future pregnancies. *Obstet Gynecol* 2011;118(5):1014.
4. Pakarinen P, Luukkainen T. Five years' experience with a small intracervical/intrauterine levonorgestrel-releasing device. *Contraception* 2005;72(5):342.
5. Heinemann K, Reed S, Moehner S, Minh TD. Risk of uterine perforation with levonorgestrel-releasing and copper intrauterine devices in the European Active Surveillance Study on Intrauterine Device. *Contraception* 2015;91(4):274.
6. Outwater EK, Siegelman ES, Hunt JL. Ovarian teratomas: tumor types, and imaging characteristics. *Radiographics* 2001;21(2):475-490.
7. Valsky DV, Esh-Broder E, Cohen SM, Lipschuetz M, Yagel S. Added value of the gray-scale whirlpool sign in the diagnosis of adnexal torsion. *Ultrasound Obstet Gynecol* 2010;36(5): 630-634.
8. Vijayaraghavan SB, Senthil S. Isolated torsion of the fallopian tube: the sonographic. Whirlpool sign. *J Ultrasound Med* 2009;28(5):657-662.
9. Oelsner G, Bider D, Goldenberg M, Admon D, Mashiah S. Long-term follow-up of the twisted ischemic adnexa managed by detorsion. *Fertil Steril* 1993;60(6):976.
10. Dilbaz S, Katas B, Demir B, Dilbaz B. Treating cornual pregnancy with a single methotrexate injection: a report of 3 cases. *J Reprod Med* 2005;50(2):141.
11. Lau S, Tulandi T. Conservative medical and surgical management of interstitial ectopic pregnancy. *Fertil Steril* 1999;72(2):207.
12. Ackerman TE, Levi CS, Dashefsky SM, Holt SC, Lindsay DJ. Interstitial line: sonographic finding in interstitial (cornual) ectopic pregnancy. *Radiology* 1993;189(1):83.
13. Tang A, Baartz D, Khoo SK. A medical management of interstitial ectopic pregnancy: a 5-year clinical study. *Aust N Z J Obstet Gynaecol* 2006;46(2):107.
14. Benson CB, Genest DR, Bernstein MR, Soto-Wright V, Goldstein DP, Berkowitz RS. Sonographic appearance of first trimester complete hydatidiform moles. *Ultrasound Obstet Gynecol* 2000;16(2):188.
15. Fowler DJ, Lindsay I, Seckl MJ, Sebire NJ. Routine pre-evacuation ultrasound diagnosis of hydatidiform mole: experience of more than 1000 cases from a regional referral center. *Ultrasound Obstet Gynecol* 2006;27(1):56.
16. Wagner BJ, Woodward PJ, Dickey GE. From the archives of the AFIP. Gestational trophoblastic disease: radiologic-pathologic correlation. *Radiographics* 1996;16(1):131.
17. ACOG Committee on Practice Bulletins-Gynecology and the SGO Education Committee. ACOG Practice Bulletin #53. Diagnosis and treatment of gestational trophoblastic disease. *Obstet Gynecol* 2004;103(6):1365.