Heterotopic pregnancy (HP) refers to the coexistence of an ectopic pregnancy (EP) together with an intrauterine (IU) gestation. The incidence of HP in natural conception is estimated to be 1 in 30,000. However, following the widespread use of assisted reproductive technology (ART), the incidence of HP has increased approximately to 1 in 100. Several hypotheses have been proposed to interpret the cause of HP including previous pelvic inflammatory disease, abnormal hormonal milieu, multiple embryos transfer (ET), large volumes of transferred medium, position of transferred embryos deeper than anticipated, and uterine contraction induced from the process of ET, whereas the main cause is still unclear.

Rupture of EP is a leading cause of pregnancy-related mortality in the first trimester. It is essential to diagnose and treat EP as early as possible. Due to the improvement of transvaginal ultrasonography (TVUS) which refers to doctors pass a transducer into the vagina to obtain internal images, and serum beta-human chorionic gonadotropin (β-HCG) measurement, the detection of EP at early gestational age (GA) has become possible. Surgery and medical treatment are two therapeutic

**Aims:** The aim of the study is to present five cases of heterotopic pregnancy (HP) patients who received transvaginal ultrasound-guided local injection of absolute ethanol (AE).

**Settings and Design:** This was a case series and literature review in Reproductive Medicine Center of the 105th Hospital of the People’s Liberation Army.

**Materials and Methods:** Five primary infertile women who underwent assisted reproductive technology were diagnosed with HP and treated with local injection of AE (1.0–2.5 ml) under transvaginal ultrasound guidance. The size of intrauterine (IU) and ectopic sacs and the level of serum beta-human chorionic gonadotropin as well as pregnancy outcomes were monitored after treatment.

**Statistical Analysis Used:** Not applicable.

**Results:** Four of five cases presented with lack of Doppler flow in the injected area after AE injection. Meanwhile, IU pregnancy proceeded well after treatment and delivered a normal newborn. One case received emergency surgery 3 h after local injection of 2.5 ml AE because of the rupture of ectopic gestational sac (GS). An early abortion was identified 7 days after the surgery.

**Conclusions:** Transvaginal ultrasound-guided local injection of AE is an alternative nonsurgical treatment for HP, yet overdose injection of AE will increase the risk of ectopic GS rupture.

**Keywords:** Absolute ethanol, assisted reproductive technology, heterotopic pregnancy, transvaginal ultrasonography

**INTRODUCTION**

Heterotopic pregnancy (HP) refers to the coexistence of an ectopic pregnancy (EP) together with an intrauterine (IU) gestation. The incidence of HP in natural conception is estimated to be 1 in 30,000. However, following the widespread use of assisted reproductive technology (ART), the incidence of HP has increased approximately to 1 in 100. Several hypotheses have been proposed to interpret the cause of HP including previous pelvic inflammatory disease, abnormal hormonal milieu, multiple embryos transfer (ET), large volumes of transferred medium, position of transferred embryos deeper than anticipated, and uterine contraction induced from the process of ET, whereas the main cause is still unclear.

Rupture of EP is a leading cause of pregnancy-related mortality in the first trimester. It is essential to diagnose and treat EP as early as possible. Due to the improvement of transvaginal ultrasonography (TVUS) which refers to doctors pass a transducer into the vagina to obtain internal images, and serum beta-human chorionic gonadotropin (β-HCG) measurement, the detection of EP at early gestational age (GA) has become possible. Surgery and medical treatment are two therapeutic
options for HP/EP.[5] Laparoscopic operation is a common surgery option which has been considered as invaluable both in diagnosis and treatment, but it still involves surgical and anesthetic risks to the mothers and their IU pregnancy. Therefore, no invasion medical treatments are proposed. Previous studies have demonstrated that most unruptured and live EP could be successfully managed through local injection of methotrexate (MTX)/potassium chloride (KCL) or in combination with systemic administration of MTX, with the benefits of no general anesthesia and less tubal damage.[6,7] However, the management of HP is more difficult and complicated than EP due to the desire to preserve the IU pregnancy. The toxic effects of MTX, even locally injection, may associate with spontaneous abortion and congenital abnormality of remaining fetus.[8] Furthermore, life-threatening neutropenia and febrile morbidity had been reported following MTX treatment to EP.[9]

To manage HP successfully and to avoid severe systematic complications and adverse effects on IU pregnancy, a novel mode of management with transvaginal ultrasound-guided local injection of absolute ethanol (AE) was employed in this study.

**Materials and Methods**

**Patients’ characteristics**

From 2014 to 2017, five patients diagnosed with HP after *in vitro* fertilization (IVF)/intracytoplasmic sperm injection (ICSI)-ET or frozen-thawed ET received transvaginal ultrasound-guided local injection of AE at our center. The patients preferred no invasion management for the strong desire to preserve the IU pregnancy. Their condition had been carefully examined as hemodynamically stable and no signs of active vaginal bleeding with the GA ≤7 weeks and unruptured ectopic gestational sac (GS). The basic characteristics of patients were listed in Table 1.

The level of serum β-HCG 14 days after ET ranged from 742.47 mIU/ml to 4066.00 mIU/ml. In case 1, an IU GS (37 mm × 23 mm) with the visible fetus heartbeat and an ectopic GS (22 mm × 8 mm) in the cervix with affluent surrounding Doppler flow and no visible fetus heartbeat were detected under TVUS 35 days after ET. The level of serum β-HCG was more than 5000.00 mIU/ml (no dilution of the serum sample). In case 2 and case 3, the size of IU GS was 19 mm × 14 mm and 29 mm × 14 mm respectively, while the size of ectopic GS was 15 mm × 8 mm in the right tube and 21 mm × 12 mm in the left tube respectively under TVUS detection on the day of 28 and 31 after ET. The fetus heartbeats of IU and EP were identified in both the cases, with the levels of serum β-HCG 38,800.00 mIU/ml and 70,164.00 mIU/ml, respectively. In case 4, an IU GS (30 mm × 15 mm) with fetus heartbeat and a right adnexal mass (19 mm × 17 mm) with fluid echo and fetus heartbeat were identified 35 days after ET. The level of serum β-HCG was 224,977.00 mIU/ml [Figures 1 and 2]. In case 5, an IU GS (24 mm × 16 mm) and an ectopic GS (14 mm × 12 mm) in the right tube were identified with fetus heartbeats in both sacs 31 days after ET. The level of serum β-HCG was 166,063.00 mIU/ml.

**The procedure of transvaginal ultrasound-guided local injection of absolute ethanol**

All the risks and benefits were informed to the patients before the treatment. The risks of sclerotherapy with AE

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**Table 1: Characteristics of women with heterotopic pregnancies**

| Case | Age (years) | History | Gravity/parity | Mode of ART | Number of embryos transferred | β-HCG level 14th day after ET (mIU/ml) | GA at diagnosis of HP (weeks) | Ectopic location | EP fetal heartbeat | AE local injection (ml) | Other comments | Pregnancy outcome |
|------|-------------|---------|----------------|-------------|-------------------------------|----------------------------------------|-------------------------------|-----------------|-----------------|---------------------|---------------|-------------------|
| 1    | 26          | Chronic salpingitis and left tubal obstruction | G0P0         | IVF-ET       | 2                             | 742.47                                 | 7                             | Cervix          | -               | 2.0                 | -             | Premature male infant |
| 2    | 23          | Bilateral tubal obstruction | G0P0         | FET          | 2                             | 824.58                                 | 6                             | Right fallopian tube | +               | 1.0; 2.0 (second injection) | Requiring second injection | Full-term live male infant |
| 3    | 27          | Laparoscopic operation for pelvic adhesion | G0P0         | ICSI-ET      | 2                             | 974.12                                 | 6+3                           | Left fallopian tube | +               | 1.5                 | -             | Full-term live female infant |
| 4    | 27          | Laparoscopic operation for right ovarian cyst | G0P0         | IVF-ET       | 2                             | 825.66                                 | 7                             | Right adnexa area | +               | 1.5                 | -             | Full-term live male infant |
| 5    | 27          | Bilateral tubal obstruction | G0P0         | FET          | 2                             | 4066.00                                | 6+3                           | Right fallopian tube | +               | 2.5                 | Surgery for ruptured ectopic GS | Early abortion |

ET: Embryo transfer, HP: Heterotopic pregnancy, EP: Ectopic pregnancy, AE: Absolute ethanol, ART: Assisted reproductive technology, β-HCG: Beta-human chorionic gonadotropin, FET: Frozen-thawed embryo transfer, IVF: *in vitro* fertilization, ICSI: Intracytoplasmic sperm injection, GS: Gestational sac, GA: Gestational age, +: EP with fetal heart beat, -: EP without fetal heart beat
are as followings: survived EP GS might need to repeat injection of AE; ruptured ectopic GS during or after treatment requires emergency surgical intervention; and an inadvertent puncture into blood vessels in the vicinity of the ectopic GS could cause severe internal hemorrhage. The benefits include the avoid of surgery and general anesthesia and no need for hospitalization as well as less cost. All the patients had been provided informed consent after counseling. All the operations were performed by a chief physician. The study was approved by the Reproductive Medical Ethics Committee of the 105th Hospital of the People’s Liberation Army (Approval No.2014A012 was obtained on 1st February in 2014).

The vulva and vagina were prepared with sterile saline solution, and then, a 17G needle (Queensland, Australia) was used to puncture into the ectopic GS under TVUS guidance (GE Logiq 5 PRO, Gyeonggi, Korea). After suctioning the contents of the GS, 1.0 ml–2.5 ml AE was injected into GS based on the size of GS and the volume of the contents suctioned. The whole time of this procedure took <10 min without anesthesia. After injection of AE, a high-intensity image in injected site was observed under transvaginal ultrasound. All patients were monitored for 3 h after the procedure.

Results

All the patients tolerated the procedure well. In cases 1–4, the size of ectopic GS shrank or disappeared and a high-intensity image in the injected site was observed. No fetal heartbeat was visualized on the 3rd day postoperation. The follow-up was done for several weeks after injection until no Doppler flow and expansive sign of ectopic GS were identified [Figure 3].

In case 1, the ectopic GS shrank from 22 mm × 8 mm to 21 mm × 6 mm 1 week later and 11 mm × 4 mm 3 weeks later, while the IU GS expanded from 37 mm × 23 mm to 45 mm × 39 mm 1 week after the treatment, and a premature male infant weighing 1500 g delivered vaginally at 30 weeks of gestation. In case 2, the ectopic GS expanded from 15 mm × 8 mm to 35 mm × 11 mm without fetal heartbeat, and the IU sac increased from 19 mm × 14 mm to 39 mm × 18 mm 2 weeks after the treatment. Serum level of β-HCG was 130,200.00 mIU/ml. Re-injection of 2.0 ml AE at the same location was performed. One week later, the ectopic GS shrank to 26 mm × 22 mm with the serum level of β-HCG 166,280.00 mIU/ml, and no re-expansion identified afterward. Meanwhile, the remaining IU pregnancy proceeded well, and a healthy male infant weighing 4050 g delivered at 38 + 5 weeks of gestation through the cesarean section. In case 3, the ectopic GS shrank from 21 mm × 12 mm to 16 mm × 12 mm, while the IU sac expanded from 29 mm × 14 mm to 36 mm × 19 mm with the serum level of β-HCG 113,208.00 mIU/ml 1 week after the treatment, and a healthy female infant weighing 2050 g delivered at 38 weeks of gestation through the cesarean section.

Figure 1: Transvaginal ultrasonography of an intrauterine gestation (left) coexisting with an ectopic gestational sac as an adnexal mass with fluid echo (right) before treatment

Figure 2: Transvaginal ultrasonography of a right adnexal mass with fluid echo and affluent Doppler flow around and visible fetus heartbeats before treatment

Figure 3: Transvaginal ultrasonography of a right adnexal mass with scanty Doppler flow around without fetus heartbeats 3 days after treatment
section. In case 4, the right adnexal mass (19 mm × 17 mm) decreased to 16 mm × 14 mm, while the IU sac increased from 30 mm × 15 mm to 43 mm × 18 mm with the serum β-HCG level 255,925.00 mIU/ml 1 week after the treatment, and a healthy male infant weighing 3200 g delivered at 40 + 3 weeks of gestation through the cesarean section. In case 5, the patient felt severe lower abdominal pain and dizziness with abdomen muscle tension and tenderness 2.5 h after the treatment, and her vital signs were as followings: pulse – 108/min; blood pressure – 70/46 mmHg; erythrocyte – 2.75 × 1012/L; hematocrit – 24.30%; and hemoglobin – 86.0 g/L. Ultrasonography scan identified a large amount of hemorrhagic fluid in the abdominal cavity. Rupture of EP and hemorrhagic shock were diagnosed, and laparoscopic surgery was performed at once. An estimated 2300 ml blood was identified in the abdominal cavity with an active bleeding point in the right tube. The ruptured right tube was resected, and 1100 ml autologous blood was reinfused into the body. After the surgery, the patient recovered well, the remaining IU sac expanded to 29 mm × 17 mm with the visible heartbeat 4 days later, and then, the patient was discharged. Unfortunately, early abortion of IU pregnancy was identified 7 days after the surgery.

No malformations were diagnosed in all four born babies, and their physical and psychomotor developments were followed up after birth. The baby of case 1 weighed 11.2 kg with 85 cm in height, while case 2 baby weighed 12.3 kg with 89 cm in height at 2 years of age. The baby of case 3 weighed 9.3 kg with 75 cm in height at 1 year of age, and the case 4 baby weighed 4.3 kg with 53.8 cm in height at 1 month after birth. Their height and body weight were comparable to the children conceived naturally in China.10

**DISCUSSION**

HP was first reported by Duverney in 1708,11 during an autopsy on a patient who had died of a ruptured EP. Early diagnosis is the key to manage HP but remains many challenges. It is acknowledged that patients with symptoms such as abdominal pain, vaginal bleeding, and rectal tenesmus might be diagnosed earlier than those without symptoms.12,13 However, these symptoms are rarely seen in HP due to the coexistence of IU pregnancy. Transvaginal ultrasonography has been considered as a valuable tool in early diagnosis of HP. However, GS might be mistaken with a hemorrhagic corpus luteum or ovarian cyst for the patients who underwent ART.14 Persistent enlargement of adnexal fluid mass with affluent blood flow may be the early ultrasonographic sign of EP. Therefore, even when an IU pregnancy is diagnosed, transvaginal ultrasonic scan should be carefully carried out to rule out HP in ART patients. In our center, the first transvaginal ultrasonography was usually performed on 30–35 days after ET. In this study, all five HP patients were diagnosed HP within 7 weeks of gestation.

The managements of HP mainly include surgery and medical treatment, while the choice remains controversial due to the desire to preserve the IU pregnancy. Local injection medicines such as MTX into EP have been demonstrated successful in managing EP or cesarean scar ectopic pregnancy,15 with the advantages of being simple, effective, less invasive, and inexpensive, although a combination with systemic MTX administration was needed sometimes.15 MTX not only can lead to embryonic development arrest but also has various side effects on the mother such as bone marrow suppression, liver enzyme elevation, rash, alopecia, and stomatitis.14 Therefore, MTX has little value in HP management for its toxic effects on both mother and IU fetus.16 Other medicines such as KCL and hyperosmolar glucose were also reported in managing HP for avoiding the potential systemic side effects and toxicity to IU pregnancy.17,18 However, a case report revealed that the therapeutic effect of KCL might not satisfactory for two of three cases abortive after local injection of KCL, suggesting that KCL might also have adverse effects to IU pregnancy.19 Studies carried out on the management of heterotopic/EP through local injection are listed in Table 2.

Laparoscopy and transvaginal ultrasound guidance are two common methods for the local administration of drugs. It had been confirmed that direct intraocular injection under ultrasound guidance was superior to the laparoscopically controlled “blind” intratubal injection.24 Furthermore, the latter needs carbon dioxide pneumoperitoneum and

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**Table 2: Summary of studies on the management of heterotopic/ectopic pregnancy through local injection**

| Author, years of publication | Number of patients | Mean age (year) | Agent | Type | Dosage | Volume |
|-----------------------------|--------------------|----------------|-------|------|--------|--------|
| Feichtinger and Kemeter, 1987(19) | 1 | 29 | MTX | EP | 10 mg | 1 ml |
| Scheiber and Cedars, 1999(20) | 1 | 37 | KCL | HP | 2 mmol/2 ml | 4 ml |
| Kaijima et al., 2006(21) | 69 | 35 | AE | EP | 0.3 ml | 0.3 ml |
| Chen et al., 2011(22) | 17/11 | 30/31 | Etoposide/MTX | EP | 50 mg | - |
| Ugurlucan et al., 2012(23) | 1 | 34 | KCL | HP | 2 mEq/ml | 2 ml |
| Allison et al., 2012(24) | 1 | 31 | Hyperosmolar glucose | HP | 50% | Equal with aspirated |
| Ishikawa et al., 2016(25) | 11 | 31 | Diluted vasopressin | EP | 4–10 units | - |

MTX: Methotrexate, KCL: Potassium chloride, AE: Absolute ethanol, HP: Heterotopic pregnancy, EP: Ectopic pregnancy
general anesthesia, which may have an adverse effect on IU pregnancy.[25]

AE is a dehydrating agent which could quickly infiltrate into the chorionic tissue surrounding the GS and then dehydrate and destroy chorionic villi. In 2006, Kajima et al.[26] first reported this novel management for the patients with EP and found that the serum level of β-HCG decreased 10%–30% within 2 h after the local injection of AE, quicker than MTX (2–3 days). Moreover, patients’ financial burdens are alleviated since AE costs less. Some prospective clinical studies had demonstrated that the local injection of AE for the patients with hydrosalpinx could improve the outcomes of IVF with no adverse effect on ovarian reserve and perinatal outcomes.[19,26,27] However, local injection of AE for EP was usually carried out at an early stage of GA (5-week gestation age), and the serum β-HCG level was <4000 mIU/mL without fetus heartbeat.[20] Furthermore, the candidates should be hemodynamically stable without the sign of ectopic GS rupture and no contraindications to the agent furthermore, patients should be followed up strictly after the operation and emergency surgery is necessary once there are signs of ectopic GS rupture.

In this study, gestation age of five cases was 6–7 weeks with the level of serum β-HCG ranged from 38,800.00 mIU/mL to 224,977.00 mIU/mL when local injection of AE was carried out, and the size of ectopic GS ranged from 15 mm × 8 mm to 19 mm × 17 mm and visible fetus heartbeats in four cases. Four cases who received local injection of AE delivered healthy live birth, and the babies’ physical and psychomotor developments were in the normal range of children conceived naturally in China,[10] indicating that the management of HP with transvaginal ultrasound-guided local injection of AE may not have adverse effects on the IU pregnancy and could be efficiently carried out within 7 weeks of GA.

The dose and concentration of agents are important for effectiveness and safety when medical treatment was carried out. In this study, the dose of AE administrated in four successful cases was all within 2.0 ml, whereas one case received emergency laparoscopic surgery for rupturing of EP when 2.5 ml AE was injected into ectopic GS, suggesting that local injection of overdose AE may lead to a higher risk of ectopic GS rupture. It was also found that the ectopic GS in one case enlarged 2 weeks after injection 1.0 ml AE. After additional injection of 2.0 ml AE being performed, the ectopic GS decreased from 35 mm × 11 mm to 26 mm × 22 mm 1 week later, and no re-expansion and any complication identified afterward. Therefore, the management of HP with transvaginal ultrasound-guided local injection of AE should be carried out in a limited volume (<2.0 ml). If it does not work efficiently, additional injection could be performed. The main limitation of this study is small sample size. In addition, the valid dose and opportunity of AE administration and its effectiveness and safety remain further evaluation through a large randomized controlled trail.

**Conclusions**

Transvaginal ultrasound-guided local injections of AE might be served as an alternative option for the management of unruptured HP at a very early stage, with the advantage of less invasive and expensive.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Goettler S, Zanetti-Dällenbach R. Heterotopic pregnancy. N Engl J Med 2016;375:1982.
2. Scheiber MD, Cedars ML. Successful non-surgical management of a heterotopic abdominal pregnancy following embryo transfer with cryopreserved-thawed embryos. Hum Reprod 1999;14:1375-7.
3. Santos-Ribeiro S, Tournaye H, Polyzos NP. Trends in ectopic pregnancy rates following assisted reproductive technologies in the UK. A 12-year nationwide analysis including 160 000 pregnancies. Hum Reprod 2016;31:393-402.
4. Refaat B, Dalton E, Ledger WL. Ectopic pregnancy secondary to in vitro fertilisation-embryo transfer: Pathogenic mechanisms and management strategies. Reprod Biol Endocrinol 2015;13:30.
5. Mol F, Mol BW, Ankum WM, van der Veen F, Hajenius PJ. Current evidence on surgery, systemic methotrexate and expectant management in the treatment of tubal ectopic pregnancy: A systematic review and meta-analysis. Hum Reprod Update 2008;14:309-19.
6. van Mello NM, Mol F, Verhoeve HR, van Wely M, Adriaanse AH, Boss EA, et al. Methotrexate or expectant management in women with an ectopic pregnancy or pregnancy of unknown location and low serum hCG concentrations? A randomized comparison. Hum Reprod 2013;28:60-7.
7. Pasic R, Wolfe WM. Laparoscopic diagnosis and treatment of interstitial ectopic pregnancy: A case report. Am J Obstet Gynecol 1990;163:587-8.
8. Faschingbauer F, Mueller A, Voigt F, Beckmann MW, Goecke TW. Treatment of heterotopic cervical pregnancies. Fertil Steril 2011;95:1787.e9-13.
9. Dasari P, Sagili H. Life-threatening complications following multidose methotrexate for medical management of ectopic pregnancy. BMJ Case Rep 2012;2012. pii: bcr0320126023.
10. Sheng XY, Xu JD, Shen XM. Key parameters and formulas for approximate average height and weight of normal Chinese children under 7 years of age. Zhongguo Dang Dai Er Ke Za Zhi 2009;11:672-4.
11. Duvemey JG. Oeuvres anatomiquest. In: Jombert CA (ed) Oeuvres Anatomiques, Paris Bailliere; 1899: p. 355.
12. Singhal M, Ahuja CK, Saxena AK, Dhaliwal L, Khandelwal N. Sonographic appearance of heterotopic pregnancy with ruptured ectopic tubal pregnancy. J Clin Ultrasound 2010;38:509-11.
13. Lyu J, Ye H, Wang W, Lin Y, Sun W, Lei L, et al. Diagnosis and management of heterotopic pregnancy following embryo transfer: Clinical analysis of 55 cases from a single institution. Arch Gynecol Obstet 2017;296:85-92.
14. Lavanya R, Deepika K, Patil M. Successful pregnancy following...
medical management of heterotopic pregnancy. J Hum Reprod Sci 2009;2:35-40.
15. Feichtinger W, Kemeter P. Conservative treatment of ectopic pregnancy by transvaginal aspiration under sonographic control and methotrexate injection. Lancet 1987;1:381-2.
16. Brunette DD, Roline C. Heterotopic pregnancy resulting from in vitro fertilization. Am J Emerg Med 2011;29:960.e1-2.
17. Allison JL, Aubuchon M, Leasure JD, Schust DJ. Hyperosmolar glucose injection for the treatment of heterotopic ovarian pregnancy. Obstet Gynecol 2012;120:449-52.
18. Chen D, Kligman I, Rosenwaks Z. Heterotopic cervical pregnancy successfully treated with transvaginal ultrasound-guided aspiration and cervical-stay sutures. Fertil Steril 2001;75:1030-3.
19. Benifla JL, Fernandez H, Sebban E, Darai E, Friedman R, Madelenat P, et al. Alternative to surgery of treatment of unruptured interstitial pregnancy: 15 cases of medical treatment. Eur J Obstet Gynecol Reprod Biol 1996;70:151-6.
20. Kaijima H, Osada H, Kato K, Segawa T, Takehara Y, Teramoto S, et al. The efficacy and safety of managing ectopic pregnancies with transvaginal ultrasound-guided local injections of absolute ethanol. J Assist Reprod Genet 2006;23:293-8.
21. Chen CH, Lee WL, Chiu LH, Sun HD, Liu WM, Wang PH, et al. A cohort study to evaluate the effectiveness of laparoscopic-guided local injection of etoposide in the management of women with unruptured tubal pregnancy. Fertil Steril 2011;96:654-8.
22. Ugurhan FG, Bastu E, Dogan M, Kalelioglu I, Alanya S, Has R, et al. Management of cesarean heterotopic pregnancy with transvaginal ultrasound-guided potassium chloride injection and gestational sac aspiration, and review of the literature. J Minim Invasive Gynecol 2012;19:671-3.
23. Ishikawa H, Unno Y, Omoto A, Shozu M. Local injection of diluted vasopressin followed by suction curettage for cervical ectopic pregnancy. Eur J Obstet Gynecol Reprod Biol 2016;207:173-7.
24. Tzafetass J, Anaplisiots S, Zournatzis V, Boucklis A, Oxouzoglou N, Bondis J, et al. Transvaginal intra-amniotic injection of methotrexate in early ectopic pregnancy. Advantages over the laparoscopic approach. Early Hum Dev 1994;39:101-7.
25. Allaert SE, Carlier SP, Weyne LP, Vertommen DJ, Dutral PE, Desmet MB, et al. First trimester anesthesia exposure and fetal outcome. A review. Acta Anaesthesiol Belg 2007;58:119-23.
26. Jiang H, Pei H, Zhang WX, Wang XM. A prospective clinical study of interventional ultrasound sclerotherapy on women with hydrosalpinx before in vitro fertilization and embryo transfer. Fertil Steril 2010;94:2854-6.
27. Zhang WX, Jiang H, Wang XM, Wang L. Pregnancy and perinatal outcomes of interventional ultrasound sclerotherapy with 98% ethanol on women with hydrosalpinx before in vitro fertilization and embryo transfer. Am J Obstet Gynecol 2014;210:250.e1-5.