

Case Report

Simultaneous cul-de-sac and tubal pregnancy following *in vitro* fertilizationCheng-En Hsieh^a, Yuh-Ming Hwu^{a, b, c, *}, Sheng-Hsiang Li^{c, d}, Robert Kuo-Kuang Lee^{a, e}^a Department of Obstetrics and Gynecology, MacKay Memorial Hospital, Taipei, Taiwan^b MacKay Medical College, Taipei, Taiwan^c MacKay Junior College of Medicine, Nursing, and Management, Taipei, Taiwan^d Department of Medical Research, MacKay Memorial Hospital, Taipei, Taiwan^e Department of Obstetrics and Gynecology, Taipei Medical University, Taipei, Taiwan

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ABSTRACT

Objective: The aim of this study is to share a valuable experience of heterotopic pregnancy following *in vitro* fertilization.**Case report:** A 37-year-old, gravida 3, para 2 (cesarean section 2 times), woman underwent *in vitro* fertilization with three embryos transferred. On Day 23 after the embryo transfer, right tubal pregnancy with a 0.7-cm gestational sac was found by ultrasound, and her serum β -human chorionic gonadotropin level was 81,388 mIU/mL. She underwent a laparotomy with right salpingectomy. On Day 43 after the embryo transfer, intermittent abdominal pains developed. A live fetus with a crown–rump length of 2.0 cm was found in the cul-de-sac. Under the diagnosis of abdominal pregnancy, she was admitted for sona-guided KCl and methotrexate injections. She received four units of packed red blood cells due to a drop in hemoglobin level from 12.5 g/dL to 8.6 g/dL. The patient recovered well, and the serum β -human chorionic gonadotropin declined to <10 mIU/mL.**Conclusion:** Various forms of ectopic pregnancy should be kept in mind in early pregnancy following *in vitro* fertilization.© 2017 Taiwan Association of Obstetrics & Gynecology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Abdominal pregnancy is a potentially lethal condition with a mortality rate 7.7 times higher than that of tubal pregnancy [1]. Delay in diagnosis of abdominal pregnancy will carry a significant risk of intra-abdominal bleeding and maternal mortality. The overall incidence of abdominal pregnancy is 10.9 per 100,000 live births [1]. However, it was estimated that the incidence of abdominal pregnancy following *in vitro* fertilization (IVF) increased three to eight times that of the general population [2]. To our knowledge, only one case of simultaneous tubal and splenic pregnancy after IVF has been reported [3]. Concomitant abdominal pregnancy in the cul-de-sac and tubal pregnancy following IVF has never been ascertained in the literature.

Case report

A 37-year-old woman, gravida 3, para 2, was admitted with a diagnosis of abdominal pregnancy at 8.5 weeks' gestation following IVF treatment and tubal pregnancy surgery. Her medical history included two cesarean deliveries and tubal sterilization. She underwent tubal reanastomosis 3 years earlier after her divorce and remarriage. Although hysterosalpingography showed patent bilateral tubes following tubal reanastomosis, she could not achieve pregnancy after three times of intrauterine insemination treatment.

The woman underwent IVF treatment with three embryos at the eight-cell stage transferred to the uterus. Embryo transfer was performed under abdominal ultrasound guidance. During the embryo transfer, the tip of the catheter (K-JETS-7019-LIU2; Cook, Brisbane, Queensland, Australia) loaded with the embryos and 20 μ L culture medium was placed at 1.5 cm from the uterine fundus, as measured by the abdominal ultrasound. Serum β -human chorionic gonadotropin (β -hCG) was 162 mIU/mL on Day 14 after the embryo transfer. It rose to 4818 mIU/mL on Day 23. Unfortunately,

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transvaginal sonography showed an absence of gestational sac in the uterine cavity along with a 0.7-cm-diameter gestational sac in the right tube. Under the impression of right tubal pregnancy, the woman underwent a laparotomy on Day 25 (approximately 5.5 weeks' gestation) after the embryo transfer. The abdomen was opened through the prior subumbilical vertical incision. Bowel loop adhesion to the pelvic sidewall and abdominal wall was noted at several sites and in the cul-de-sac. An enlarged, congested right fallopian tube full of blood clots was found during the laparotomy. The left ovary and left tube were intact and grossly normal. Right salpingectomy was then performed. Pathological examination revealed the lumen of right tube being filled with chorionic villi and blood clots. Left cornual tubal ligation with partial resection of the left tube was also performed to prevent tubal pregnancy in the future.

On Day 18 after the laparotomy (43 days after the embryo transfer, corresponding to about 8.5 weeks after the last menstrual period), the woman came back complaining of abdominal pains. Ultrasound examination showed a live fetus with a crown–rump length of 2.0 cm outside the uterus. The placenta with the live fetus at approximately 8.5 weeks' gestation was located in the left side of the cul-de-sac and distant from both ovaries. The bowel loops separated the embryo from both ovaries and the uterus (Figures 1–3). Only the thin chorionic and amniotic membranes walled off the live embryo from the bowel loops. Serum β -hCG level increased to 81,388 mIU/mL. A diagnosis of abdominal pregnancy with 8.5 weeks' gestation was made. After adequate counseling, the woman opted for nonsurgical treatment. On the next day, an 18-gauge needle was punctured into the fetal thorax under transvaginal sonographic guidance. Potassium chloride (KCl; 2 meq/mL) solution was injected with 0.5–1 mL bolus each time. A total of 2.5 mL KCl solution was injected until cessation of the cardiac activity. Then, 50 mg of methotrexate was introduced via the same route to ensure destruction of the embryo.

On the next day after KCl and methotrexate injections, hemoglobin level declined from 12.5 g/dL to 8.6 g/dL. Ultrasound examination revealed intra-abdominal hemorrhage and blood clots around the gestational sac. Hemoglobin level was restored to 12.1 g/dL after the transfusion of four units of packed red blood cells. The patient's vital signs remained normal during the procedures. On Day 3 after the KCl injection, her serum β -hCG decreased to 38,480 mIU/mL. The woman recovered very well and was discharged the next day. Two weeks after the procedures, serum β -hCG level decreased to 10,660 mIU/mL. Seven weeks after the KCl injection, serum β -hCG decreased to <10 mIU/mL.



Figure 1. Gestational sac was located outside the uterus and distant from both ovaries. Bowel loops separated the embryo from the right ovary.

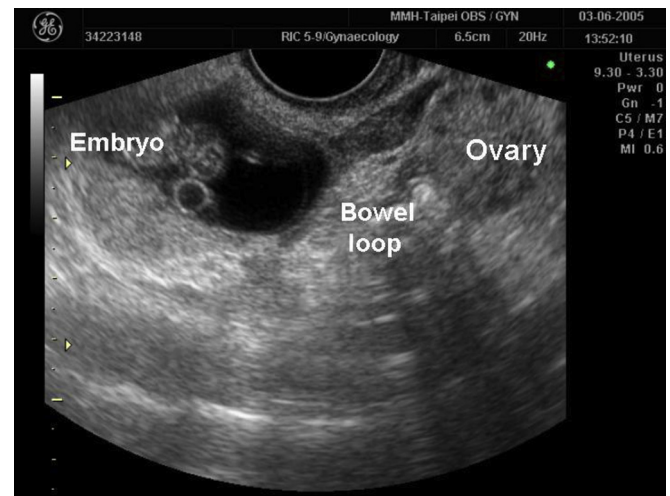


Figure 2. Bowel loops separated the embryo from the left ovary.

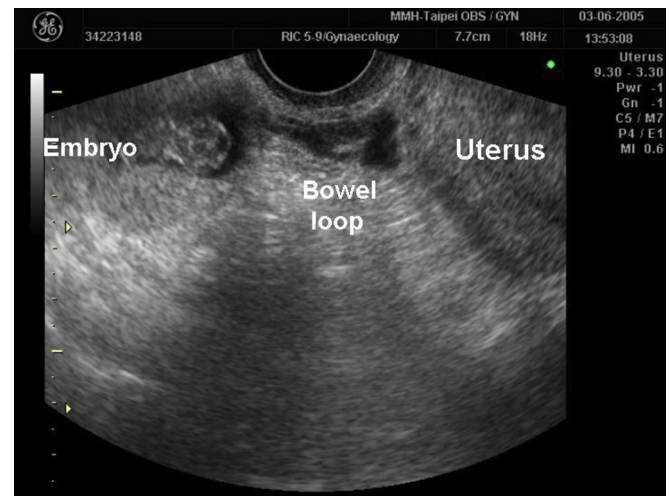


Figure 3. Bowel loops separated the embryo from the uterus.

Discussion

This woman had undergone tubal reanastomosis. Thus, bilateral fallopian tubes were shorter than the normal ones. The possible pathogenesis of concomitant abdominal pregnancy and tubal pregnancy in this case may be due to the migration of one embryo through the fallopian tubes and subsequent implantation in the cul-de-sac. It is difficult to establish whether this was a primary abdominal implantation or a secondary implantation after a tubal abortion. Another embryo might have implanted in the right fallopian tube and developed the tubal pregnancy. At the time of surgery for tubal pregnancy (5.5 weeks' gestation), there was no fetal pole in the gestational sac. The diagnosis of concomitant abdominal pregnancy and tubal pregnancy at this time can be very difficult by using transvaginal ultrasound. The gestational sac of tubal pregnancy in this case was only 0.7 cm in diameter. At the same time, the gestational sac of abdominal pregnancy was estimated to be around 1–2 cm in diameter, covered with adhesion tissues in the cul-de-sac [4]. Concomitant abdominal pregnancy was not suspected at the time of operation for tubal pregnancy. Careful exploration and dissection of all the adhesions of the cul-de-sac were not performed in this woman. Nevertheless, missed

diagnosis of a concomitant abdominal pregnancy may lead to a lethal complication.

Traditionally, the treatment for abdominal pregnancy has been laparotomy or laparoscopic surgery. This patient was not considered suitable for laparoscopic surgery because of the bowel adhesions after four times of subumbilical vertical incision. After all treatment modalities had been discussed, the woman opted for nonsurgical treatment. Transvaginal ultrasound-guided KCl injection is an easy and safe procedure if the gestational sac of abdominal pregnancy is located in the cul-de-sac. To our knowledge, only two cases of early abdominal pregnancy treated with transvaginal sona-guided KCl injections have been reported [5,6]. Although abdominal pregnancy was successfully treated, the woman developed intra-abdominal bleeding the next day following the procedure. This complication was not clarified in the two previously reported cases. It is possible that the vessels of the placenta or the implantation site degenerated and ruptured after feticide procedures. However, bleeding can be controlled conservatively by blood transfusion.

Early detection of an abdominal pregnancy or heterotopic abdominal pregnancy before 6 gestational weeks poses a great challenge to the clinicians. This case highlights the importance of contemplating the possibility of an association with abdominal

pregnancy when treating patients with tubal pregnancy following IVF. Although tubal pregnancy concomitant with abdominal pregnancy is considered a rarity, it is advisable to examine the peritoneal cavity thoroughly during an operation for tubal pregnancy following IVF.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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