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Cornual heterotopic pregnancy after *in vitro* fertilization: management by laparoscopic repair

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ABSTRACT

The incidence of heterotopic pregnancy has risen dramatically with the widespread use of assisted reproductive technology. The risk factors for this pathology include tubal infertility, cleavage stage embryo transfer and frozen embryo transfer. Herein we report two cases with cornual heterotopic pregnancy after *in vitro* fertilization/embryo transfer. They managed by laparoscopic cornual repair or salpingectomy. Early diagnosis and appropriate management of heterotopic pregnancy may lead to a favorable prognosis.

Keywords: Cornual heterotopic pregnancy, *in vitro* fertilization, laparoscopic cornual repair

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Ectopic pregnancy is still a leading cause of maternal mortality in the first trimester of pregnancy. The co-existence of an ectopic pregnancy with a viable intrauterine pregnancy is known as heterotopic pregnancy affecting about 1% of patients during assisted conception [1, 2].

Cornual pregnancy is a rare entity, representing 2% of ectopic pregnancy. Its management is difficult and manipulated according to clinical situation. A history of tubal infertility, pelvic inflammatory disease and specific aspects of embryo transfer technique are the most significant risk factors for heterotopic pregnancy [1]. Recent advances in imaging modalities have led to the early and accurate diagnosis of non-tubal ectopic pregnancy. The combination of ultrasound (USG) and serum beta human chorionic gonadotrophin (β-hCG) is the most reliable tool for diagnosis.

Herein we presented two cases of cornual pregnancy coexisting with intrauterine pregnancy.

CASE PRESENTATION

Case 1

A 32-year-old primipara, who had two previous intrauterine inseminations (IUI) and two intracytoplasmic sperm injection (ICSI) at another clinic was referred to our clinic for a second opinion. She had loss of two pregnancies before 8th week of gestation. She had been undergoing infertility treatment for nine years. Clinical information received from the previous clinic included: semen analysis, within normal limits hysterosalpingography (HSG), patent left Fallopian tube and peritubal adhesions on right side. Serum hormone levels were within normal limits (On Day 3, follicle-stimulating hormone: 8.3 IU/L, luteinizing hormone: 2.5 IU/L, prolactin: 16.3 ng/ml; On Day 21, progesterone: 15.6 ng/ml, AMH: 2.4 ng/ml). She had hypothyroidism, and was taking anti-thyroid drugs for six years. Chromosomal analysis was normal for the couple. Before the ICSI,

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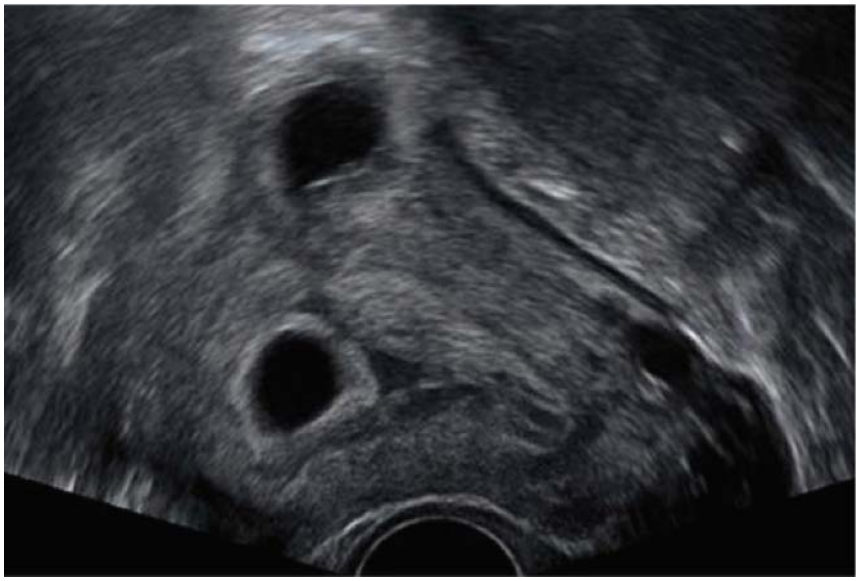

Figure 1. USG appearance of the first case.

we decided to perform laparoscopy and hysteroscopy to rule out any mechanical obstacle for implantation.

During laparoscopy there was a hydrosalpinx on right side and we did cornual blockage. Hysteroscopy was normal. The patient underwent ICSI in our clinic. The ovarian stimulation was performed with antagonist protocol initiated with 225 IU recombinant FSH/day. Six ova were harvested, and all were fertilized via ICSI. Although semen analysis was previously reported as normal, ICSI was performed during the *in vitro* fertilization (IVF)/ICSI cycle due to a low motility (< 22%) found during that cycle.

On day 5, two embryo transfers were done under ultrasound guidance with a soft-tipped catheter. The endometrial thickness was 11 mm, and the embryos were expelled into the uterine cavity approximately 1 cm from the uterine fundus with good visualization. A subsequent pregnancy test was positive, and the serum β-HCG was 75 IU/L at 4 weeks 0 days of gestation from embryo transfer (post-OPU 14 days). Two days later we checked the serum β-HCG level again which was 151 IU/L.

USG was performed and a gestational sac (GS) was located in the uterus at sixth week of gestation. One week later, she came to our clinic with vaginal bleeding and abdominal discomfort. Intraabdominal bleeding was diagnosed during USG. Also there was an intrauterine 7 weeks of pregnancy with heartbeat, and a cornual pregnancy was detected (Figure 1). We performed laparoscopic cornual repair (Figure 2a-c). Intrauterine pregnancy has continued and she gave a live birth at term by cesarean section.

Case 2

A 40-year-old multipara who had four previous ICSI at another clinic was referred to our clinic for a new trial due to male infertility. She had an 8 years old boy with motor mental retardation because of a perinatal asphyxia and a 2-years old healthy girl achieved by ICSI. She has two cesarean sections previously. Hormone profile and HSG were normal. We give antagonist protocol and picked up 7 oocytes. Under ultrasound guidance, we gave 2 embryos on day 4. β-hCG was 38 IU/L after oocyte pick up on 14th day. Two days later it increased 157 IU/L. We saw the patient at 6th week of gestation and detected intrauterine pregnancy with heartbeat. At 11th week of gestation she admitted to hospital with severe abdominal pain and hypotension. During USG there was an intraabdominal bleeding and a gestational sac with fetal heart beat on the left corn. Laparoscopy was performed on vital indication with excision of the ruptured hemorrhagic left cornual pregnancy. There was no problem during the postoperative course. The intrauterine pregnancy viability was confirmed postoperatively, and she was discharged on her first postoperative day. The intrauterine pregnancy continued uneventfully. A healthy girl was delivered by cesarean section.

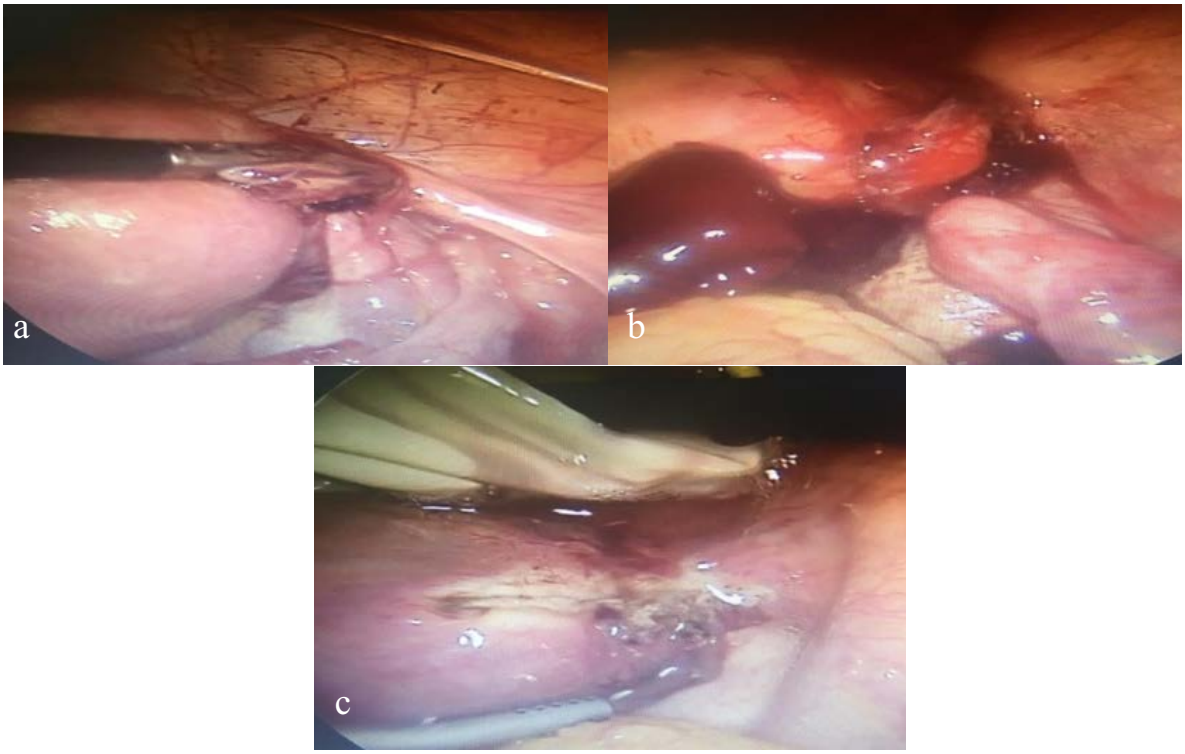

Figure 2. Laparoscopic appearances of the case (a, b and c).

DISCUSSION

The literature review demonstrates that cornual pregnancy is a very rare condition and more likely when additional risk factors for ectopic pregnancies are present, such as hydrosalpinges, blocked tubes, endometriosis, fibroids or prior tubal ectopic pregnancies.

Cornual pregnancy occurs in an area in which a rich blood supply is provided by the vascular anastomosis of the uterine and ovarian arteries [3]. Because of this mortality and morbidity occur more frequently [4].

Recently, the diagnosis of ectopic pregnancy has been possible before rupture because of improvements in USG and early sensitive serum β-hCG measurements [5]. Heterotopic pregnancy diagnosis is sometimes very difficult for clinicians because of widely, varying clinical features. Although timely diagnosis of heterotopic pregnancy must be done urgently, it remains challenging. Clinical manifestations of heterotopic pregnancy include abdominal pain and vaginal bleeding, and are also observed in intrauterine pregnancy. Treatment options of heterotopic pregnancy are surgery, medical treatment, and expectant management for maintaining intrauterine pregnancy.

Most women with heterotopic pregnancy present with hemodynamic instability because of rupture. Therefore, surgery could be the first option with these patients. Laparoscopic suturing is a controversial issue forcornual pregnancies. If a myometrial gap results from evacuation of the cornual pregnancy, the gap requires suture closure to minimize the risk of uterine rupture with intrauterine pregnancy [6].

The main concern with laparoscopic treatment of cornual pregnancy is the subsequent risk of uterine rupture and recurrence of the cornual ectopic pregnancy [7]. A number of uneventful pregnancies have been reported in addition to instances where uterine rupture or subsequent heterotopic pregnancy have occurred [8-11].

Careful individualized antenatal care and planned cesarean delivery at term (>37 weeks) appear to be the safest approach in these cases during future pregnancies [12].

It is advisable that a transvaginal USG should be performed at 5 to 6 weeks gestation in the subsequent

pregnancy to rule out a recurrence of cornual pregnancy [13].

It is difficult to discover an ectopic pregnancy during a spontaneous pregnancy, but, for a patient who presents regularly at a hospital during early gestation, early diagnosis is facilitated.

First case was very likely to be misdiagnosed as an intrauterine normal (75 IU/L). However, the literature contains a report of a ruptured ectopic pregnancy with an β-hCG level of <10 IU/L [14]. Thus, we must keep the possibility of an ectopic pregnancy in mind at all times, even if the β-hCG titer is very low. The bleeding 7 days after the diagnosis of pregnancy was misdiagnosed as threatened abortion via a telephone conversation; however, it was actually due to cornual pregnancy. This situation can often occur during a normal pregnancy. An intrauterine gestational sac was detected when the patient presented at our clinic 12 days after the first positive β-hCG level. Based on the day of transfer, a yolk sac has been observed within the echogenic area. The risk of heterotopic pregnancy after IVF/ICSI is increased by the number of embryos [15, 16].

As a mechanism for heterotopic pregnancy by IVF/ICSI, aspects of the transfer that may increase the risk of ectopic pregnancy include a large volume of transfer media, induction of abnormal uterine contractions, and the location of the embryo transfer in relation to the uterine fundus [5]. The endometrial thickness was also linked to an increased risk of ectopic pregnancy [17]. Thus, it may be that heterotopic pregnancy may occur when some factors are present at the same time.

However, no gold standard has yet been defined and data regarding recurrence of cornual pregnancies in subsequent pregnancies after different treatments are sparse [18].

CONCLUSION

These two cases were a rare occurrence, and can occur even in cases where the index ofsuspicion would be theoretically low. The incidence of heterotopic pregnancy has risen dramatically with the widespread use of assisted reproductive technology. Early diagnosis and appropriate management of heterotopic pregnancy may lead to a favorable prognosis. Laparoscopic cornual repair appears to be an effective treatment in this condition.

Authorship declaration

All authors listed meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors, and all authors are in agreement with the manuscript.

Informed consent

Written informed consent was obtained from the patients for publication of this case report and any accompanying images.

Conflict of interest

The authors declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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