

(CASE REPORT)



## Ovarian pregnancy after *in-vitro* fertilization with embryo transfer: A case report

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### Abstract

**Background:** Ovarian pregnancy, a rare but life-threatening complication, has seen an increase in incidence with the development of assisted reproduction technology (ART). The exact mechanism of ovarian pregnancy after IVF remains unclear; however, factors such as reverse migration of embryos and *in-vivo* fertilization of anovulated oocytes have been proposed.

**Case Presentation:** We present a case of a 42-year-old woman with poor ovarian reserve who underwent IVF-ET using donor follicles. Despite adherence to instructions against coitus during and after the IVF cycle, a transvaginal ultrasound revealed a right ovarian pregnancy, which ruptured during ultrasound examination. The patient underwent exploratory laparotomy, and had a satisfactory recovery.

**Conclusion:** This case emphasizes the importance of considering ovarian pregnancy in the differential diagnosis of ectopic gestations post-IVF as early recognition and intervention are paramount for optimal patient outcomes. Surgical treatment with wedge resection of the ovary alongside the gestation or product of conception has been considered gold standard of care.

**Keywords:** Ovarian pregnancy; Ectopic pregnancy; *In vitro* fertilization; Embryo transfer; Wedge resection; Oophorectomy

### 1. Introduction

Ovarian pregnancy is a rare but life-threatening complication accounting for approximately 3% of all natural extrauterine pregnancies, 0.3% of all *in-vitro* fertilisation (IVF) pregnancies and 6% of all IVF ectopic pregnancies [1,2]. Thus, the incidence of ovarian pregnancy has been on the increase with the development of assisted reproduction technology (ART) [2]. The first human conception achieved after *in-vitro* fertilization and embryo transfer (IVF-ET) by Steptoe and Edwards in 1976 was an ectopic pregnancy (EP) [3]. The incidence of spontaneous primary ovarian pregnancy ranges from 1 in 7000 to 1 in 60000 deliveries [3]. Two mechanisms that have been used to explain ovarian pregnancy include retrograde migration of the embryo towards and into the ovary via the fallopian tube, and *in-vivo* fertilization of an anovulated unrecovered oocyte [2-4]. Based on this, ovarian pregnancy can be classified as primary (follicular fertilization) or secondary (reverse embryo migration through the tube) [4]. Although the possibility of direct fertilization inside the ovary cannot be ruled-out in event that coitus occurred, the mechanism of ovarian pregnancy following IVF is most likely the ectopic implantation of the embryo on the ovarian surface following its reverse migration from the endometrial cavity [2,4].

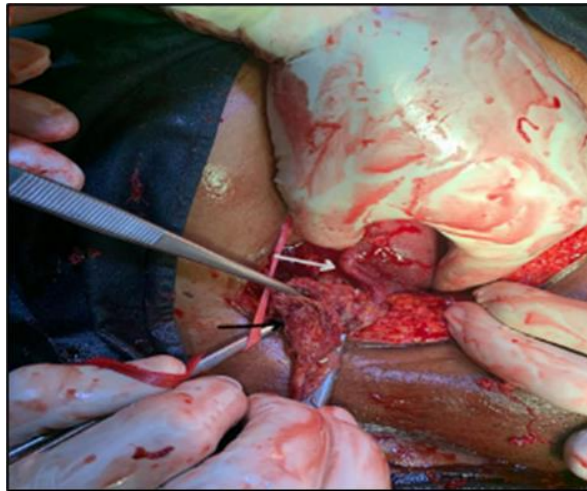
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In this case report, we present an interesting case of ovarian pregnancy after IVF and embryo transfer.

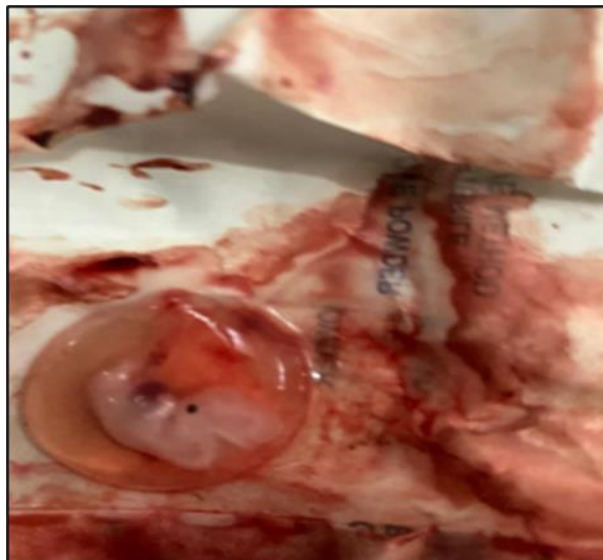
## 2. Case presentation

A 42-year old woman with poor ovarian reserve had IVF-ET with donor follicles using antagonist protocol. She was counselled against, and did not have, coitus during and after the IVF cycle. Three fresh blastocysts were transferred resulting in conception with positive urine and serum pregnancy tests. However, a transvaginal ultrasound scan (TVS) done at an estimated gestational age of 10 weeks revealed an empty uterus and a gestational sac in the right adnexium. A second opinion TVS reaffirmed the suspicion of a right ovarian pregnancy which however, ruptured during the ultrasound scan.

The patient was immediately rushed into the theatre for exploratory laparotomy. Peritoneal adhesions were noted in the pelvis involving both fallopian tubes. The uterus and the left ovary appeared grossly normal. Alongside the removal of the gestational sac, a wedge resection of the ovary was performed, the remnants of the right ovary reconstructed with a 3/0 Vicryl suture, and haemostasis properly secured. Approximately 500mls of blood was lost during the operation. There was no fistula seen intraoperatively connecting the uterus with the right adnexium or the broad ligament. Histology revealed ovarian tissue with areas of haemorrhage and chorionic villi thus, confirming a right ovarian ectopic pregnancy. The lady had a satisfactory recovery and was discharged on the 5<sup>th</sup> post-operative day.



**Figure 1** Uterus with the right fallopian tube and the ruptured ectopic (White Arrow = Fallopian tube, Black Arrow = Ruptured ectopic)



**Figure 2** The gestation

### 3. Discussion

Ovarian extrauterine pregnancy is a rare diagnosis after IVF-ET, mostly resulting from retrograde migration of a fertilized embryo from the uterine cavity towards the fallopian tube and implanting on the ovary [3]. Factors that could account for this migration include higher volume of culture medium injected during ET, higher injection pressure into the uterine cavity, transcervical embryo placement too close to the uterine fundus, high number of transferred embryo, transfer of blastocyst stage of the embryo, scars on the ovarian surface from prior oocyte retrieval, patient in a dorsal position during ET with the head tilted down, and supraphysiologic levels of estrogen and progesterone following ovarian stimulation [1,2,4-6]. The second mechanism for ovarian pregnancy after IVF is in-vivo fertilization of an anovulated oocyte [2-4]. The exact mechanism of ovarian pregnancy after IVF in the case we described is unclear, and direct fertilization inside the ovary is unlikely as patient was instructed to avoid coitus during the ART cycle. Other risk factors associated with ovarian ectopic pregnancy include intrauterine device (IUD) use, pelvic endometriosis, previous pelvic surgery, tubal infertility and postoperative pelvis adhesions [4,7,8].

Despite being a life-threatening complication and requiring early diagnosis and treatment, preoperative and, less commonly, intraoperative diagnosis can be challenging. When symptomatic, ovarian pregnancy presents with symptoms such as amenorrhoea, vaginal bleeding, and abdominal pain which are akin to those of tubal pregnancy [4]. However, index of suspicion should be raised preoperatively by an empty uterus on transvaginal ultrasound scan as well as rising serum beta-hCG levels bearing in mind that ovarian ectopic gestations can bear sonographic semblance with corpus luteum cyst, haemorrhagic ovarian cysts or a tubal pregnancy pregnancy [4]. Spiegelberg's criteria for ovarian pregnancy which are based on intraoperative findings and established in 1868 by a German gynaecologist includes intact ipsilateral fallopian tube separate from the ovary, the gestational sac located in the region of the ovary, the ectopic pregnancy connected to the uterus by the ovarian ligament as well as ovarian tissue attached to, and in, the ectopic gestation in the histologic specimen [2,8]. These criteria were met by our case.

The gold standard of surgical treatment for ovarian extrauterine pregnancy has been considered to be laparoscopic wedge resection of the ovarian gestation with preservation of ovarian tissues [2]. However, salpingo-oophorectomy or oophorectomy are other options of surgical treatment [4]. Laparoscopic technique, when compared with laparotomy, results in more rapid postoperative recovery time, reduced hospital stay, and better cosmetic outcome [7]. Exploratory laparotomy was done in the case we described. Medical management with both systemic and intragestational sac administration of methotrexate and, recently, intragestational sac administration of etoposide has been reported [2,4,9].

In terms of postoperative outcome, the recurrence rate of ovarian pregnancy is known to be profoundly rare, as subsequent pregnancies are almost always intrauterine, as opposed to patients with tubal pregnancies [3,7].

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### 4. Conclusion

This case report underscores the importance of considering ovarian pregnancy in the differential diagnosis of ectopic gestations, post-IVF. Early diagnosis through a combination of clinical suspicion and imaging modalities, such as transvaginal ultrasound, is crucial for timely intervention and optimal patient outcomes. Although surgical management with wedge resection of the ovary along with the gestation remains the cornerstone of treatment as demonstrated in our case, medical management with intragestational sac methotrexate and etoposide have been explored in unruptured cases.

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

#### *Statement of Informed consent*

Informed consent was obtained from all individual participants included in the study.

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