

# Diagnosis and Conservative Treatment of Ovarian Ectopic Pregnancy: A Case Series

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## **Abstract**

*We present three cases of ovarian ectopic pregnancy (OEP). Pre-operative diagnosis of ovarian pregnancy is difficult, and correct diagnosis is often made during surgery. In this series, OEP was suspected pre-operatively in 2 out of 3 patients. Laparoscopy was performed in all 3 cases and the OEP pregnancies were removed by selective peeling, sparing the ovaries. However, localizing the OEP can sometimes be difficult especially after oocyte pick-up in IVF. Performing intra-operative ultrasound can be useful to confirm complete resection of the OEP.*

## **Keywords**

*Ovarian pregnancy, ectopic pregnancy, laparoscopy, intra-operative ultrasound*

## I. Case Report

### Case 1:

A 42-year-old nulliparous was referred to the gynecology department because of a pregnancy of unknown location after IVF treatment at a gestational age of 6+3 weeks. The  $\beta$ -HCG was 1729 IU/l with a progesterone level of 11,9 mcg/l. The patient had undergone an oocyte pick-up (OPU) four weeks earlier, with two embryos transferred on the 3rd day after retrieval. She reported an episode of minor vaginal bleeding two weeks later, and an episode of right fossa pain three weeks after the embryo transfer (ET). Ultrasound examination showed an empty uterus and an echogenic ring on the right ovary medial from the corpus luteum suggestive for OEP (**figure 1**). Both ovaries had multiple hemorrhagic cysts, related to the recent OPU.

A diagnostic laparoscopy was performed and showed a normal uterus, with normal bilateral tubes, but on the surface of the left ovary, there was a hemorrhagic mass. After removing the clot, a small incision was made at the precise side of the ovary where the OEP was reported on the ultrasound scan and tissue suggestive for trophoblast was removed and sent for peroperative histological examination. During the procedure, there was only minor blood loss. Subsequently the abdomen was filled with saline to enable a peroperative transvaginal ultrasound scan. On ultrasound the echogenic ring on the left ovary could no longer be visualized, and histological examination confirmed the presence of trophoblastic tissue as well, affirming the

diagnosis of ovarian pregnancy. Three days after surgery  $\beta$ -HCG levels showed a decrease to 302 IU/l. Complete negativation was reached 3 weeks after surgery.

### Case 2:

A 31-year-old multiparous woman was referred for a pregnancy of unknown location at 6+2 weeks gestational age after spontaneous conception. The  $\beta$ -HCG level was 6807 IU/l. Five days earlier, she had some minor vaginal bleeding. The scan showed an ectopic pregnancy with a yolk sac near the left ovary with presence of free fluid. A tubal pregnancy was suspected. However, during laparoscopy the diagnosis of an ovarian pregnancy was made (**figure 2**).

Selective resection of the pregnancy was performed. There was minimal peroperative blood loss. Intra-operative ultrasound confirmed complete removal obviating the need for peroperative histologic confirmation of trophoblastic tissue.

### Case 3:

A 32-year-old, multiparous, pregnant patient with uncertain gestational age was seen at the emergency room because of acute abdominal pain. The  $\beta$ -HCG was 1582 IU/l. Ultrasound scan showed a hemoperitoneum and an echogenic mass on the left ovary as well as a dilated left tube suspicious for a ruptured OEP on the left ovary or a left tubal pregnancy. Laparoscopy confirmed the diagnosis of a ruptured OEP, and selective resection of the pregnancy was performed. Complete removal was confirmed by intra-operative ultrasound (**figure 3**).

## II. Discussion

Performing ovarian sparing surgery by peeling out the mass, the ovarian pregnancies were successfully removed in all 3 cases, and intra-operative ultrasound confirmed the complete removal of the pregnancy.

Ovarian pregnancies are rare. Up to 3.6% of all ectopic pregnancies are located on the ovary [1-3]. Although evidence remains scarce, many theories and risk factors have been suggested to explain this condition. Fertility treatments (18.1%) and intra-uterine contraceptive devices (19.3%) are important risk factors in OEP [4].

Zhu Q et al. found that if pregnancy occurs with intra-uterine devices, the risk of OEP increases compared to an intra-uterine pregnancy (OR of 8,42) [5]. Risk factors for ovarian pregnancies might be different from tubal pregnancies, as no association was found with chlamydia trachomatis and previous adnexal surgery [5].

Two mechanisms are possible to cause implantation of an embryo inside an ovary: direct fertilization inside the ovary, caused by various disturbances in ovum release, or implantation of a fertilized embryo after retrograde transport from the uterus or the Fallopian tube, suggesting embryo migration [5,6].

Patients with OEP may complain of abdominal pain or vaginal bleeding or might even be asymptomatic. However, the woman might also present with hypovolemic shock due to acute intra-abdominal bleeding from the highly vascularized ovarian tissue [7]. Shock, rupture, hemoperitoneum, and emergency laparotomy appear to occur significantly more

frequently in OEP compared to tubal pregnancy [5].

Still, ultrasound diagnosis of OEP remains challenging, and the condition is often misdiagnosed as a tubal pregnancy as illustrated in our second case. However, pre-operative diagnosis could be made in two of our cases representing how OEP is visible on ultrasound scan (**figure 1**) as a wide echogenic ring with an echolucent internal area. However it may be challenging to differentiate a corpus luteum from a gestational ovarian sac [8].

An interesting finding in all three cases is that the corpus luteum was located on the same ovary, adjacent to the OEP. We suspect that the vascularization of OEP arises from the vascularity of the corpus luteum.

Nowadays, the surgical treatment of choice is a laparoscopy with selective resection of the OEP or by wedge excision with diathermia to maintain hemostasis [4]. Fertility and the ipsilateral ovarian function can thus be preserved. Oophorectomy is rarely indicated [4,9]. Mainly after recent ovarian hyperstimulation, precise localization of the ovarian pregnancy at laparoscopy can be difficult despite mapping during preoperative ultrasound diagnosis. Intra-operative ultrasound examination can be helpful to identify the OEP location and to confirm complete removal of the trophoblast while preserving as much ovarian tissue as possible. The use of Methotrexate has also been investigated for the treatment of OEP but was reportedly unsuccessful [10].

Our surgical approach, selective resection of the OEP with diathermia to maintain hemostasis in combination with an intra-operative ultrasound scan to confirm the exact

location and the complete removal, was useful to perform optimal ovarian sparing surgery. A unilateral oophorectomy should be considered in case of life-threatening bleeding only. In case of suspected ectopic pregnancy with normal peroperative appearance of tubes, an intra-operative ultrasound scan is to be considered to exclude OEP before proceeding with dilation and curettage.

### **Acknowledgments**

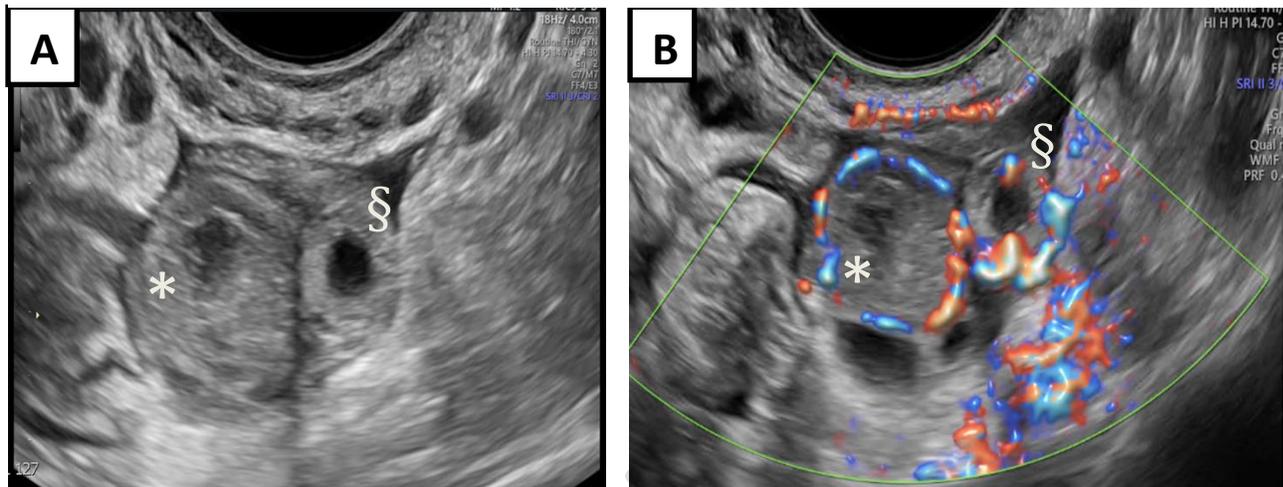
We have no conflicts of interest to disclose.

### **IRB approval**

This manuscript was formally reviewed and approved by the Ethics Committee Research UZ/KU Leuven. Oral consent was obtained for all participants of this case series.

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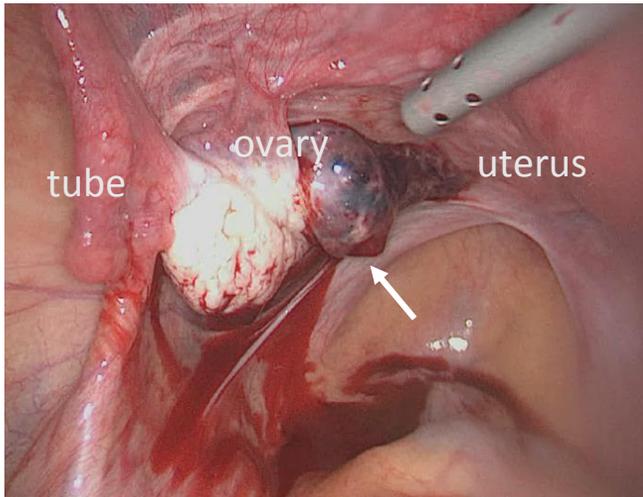
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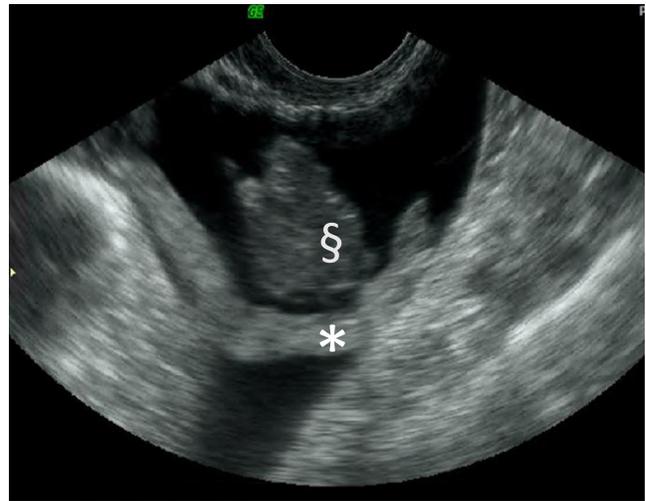
**Figure 1:** (A) left ovary containing corpus luteum (\*), ovarian ectopic pregnancy (§)

(B) doppler flow with circular vascularization of corpus luteum (\*) and vessel going to ectopic pregnancy. (§)

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**Figure 2:** laparoscopic view of ovarian pregnancy on left. Ovary (arrow), and intact tube can be visualized.



**Figure 3:** intra-operative ultrasound of left ovary after removal of OEP. Tube (\*), and ovary (§) can also be seen.