

Ovarian tumour: ovarian pregnancy. Diagnosis and management

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Summary

An ovarian mass in a premenopausal patient has many differential diagnoses. In young patients the mass is most likely to be benign. Sometimes patients with an abdominal mass will present as acute abdomen. If the patients have an IUD and a positive test for serum HCG, an ectopic ovarian pregnancy has to be suspected. However one also has to take into consideration the possibility of an ovarian germ cell tumour. The latter occurs in young patients, presents as an ovarian mass and can produce HCG. The preoperative and even intraoperative diagnosis are difficult. In these cases where there is a suspected ovarian mass and no clear diagnosis a laparoscopic approach should be considered. Patients with an ovarian pregnancy have a good prognosis for future fertility and therefore conservative surgical management is advocated. The approach and treatment modalities of an ovarian pregnancy are discussed.

Key words: Ovarian tumour; Ovarian pregnancy; Carcinoma; Treatment; Laparoscopy; Laparotomy; Ectopic pregnancy.

Introduction

Young patients who present with acute abdomen and an ovarian mass should be approached very carefully. Most likely these masses are benign however in rare cases one will find an ovarian pregnancy or an ovarian tumour.

Primary ovarian pregnancy is a rare entity that is increasing in incidence [1]. The first reported case of ovarian pregnancy was in 1682 by de Saint Maureice, a physician in Perigod, France [2]. However it was Catherine Van Tussenbroek of Amsterdam who first gave an accurate clinical and histological description of the abnormality [3]. Until now less than 200 cases have been published in the literature. It is estimated that ovarian pregnancy accounts for 0.5-3% of all ectopic pregnancies [4-7]. The incidence ranges from as low as 1/60,000 to as high as 1/7,000-60,000 pregnancies [8]. Among the sites in which pregnancy may develop ectopically, the ovary may have the greatest ability to accommodate a pregnancy and offer the highest chance of development to term and survival of the infants. As many as 4-12% of ovarian pregnancies have been reported to be within the third trimester [8-10]. However, there are only two reports of ovarian pregnancies with live infants [11, 12].

Proposed etiological factors for developing an ovarian pregnancy are probably: pelvic inflammatory disease (PID) [5, 13-17]; intrauterine device (IUD) [5, 13-16, 19-21]; prior pelvic surgery, in vitro fertilisation [22], inefficient tubal function, endometriosis and smoking. There is no consistent relationship with parity, socio-economic class, menstrual history, or body mass index [23].

In 1878 Spiegelberg described the criteria for ovarian pregnancy: (1) the tube of the involved side must appear unruptured, (2) the gestational sac must be located on the ovary (3) the gestational sac must be linked to the uterus

by the utero-ovarian ligament and (4) ovarian tissue should be located in the sac wall [24].

The clinical pictures of ovarian pregnancy and tubal pregnancy are indistinguishable during early gestation. The diagnosis is clinically difficult and nearly impossible even intraoperatively. The diagnosis is often retrospective and based on the criteria of Spiegelberg. The approach is almost exclusively surgery, although some have used methotrexate as a treatment. Today, preservation of fertility is almost always possible.

Case report

A 28-year-old woman, G3P3A0, presented at the Emergency Room for pain in the right hypochondria and right flank. She had never had any medical problems or operations, used no medication, and as a contraceptive she had an intrauterine device (Copper-T device). At presentation she was a normal, not pale, looking patient with a mild temperature 37.6°C. There was normal peristalsis and the abdomen was only tender and painful during deep palpation. Her last menses were on time, 15 days before, but she still had a little vaginal discharge. Pelvic examination revealed a normal sized uterus in anteversion flexion, normal left ovary, and a tender right ovarian mass. Subsequently transvaginal ultrasound was performed showing a normal sized uterus in anteversion with an endometrial thickness of 15 mm, and with an IUD in situ and a regular normal appearing left ovary. On the right side there was a cystic mass of 4 by 4 cm, probably in the right ovary. This mass was partly solid and partly fluid, with an irregular surface. There was only a small amount of free fluid in the Douglas pouch. Clinically this could be the picture of a corpus luteum, haemorrhagic cyst, PCO or ovarian cancer or an extra uterine gravidity. Subsequently HCG was 11,120 and haematocrit and haemoglobin were respectively 35.5 (normal 37-46) and 12.0 (normal 12-15).

Laparoscopy was performed showing a haemorrhagic mass in the right ovary draped by the fimbriae. The mass was connected to the uterus and the tube was intact. The surface had the appearance of a blood clot. Clinically there was the impression of an ovarian pregnancy. The mass was excised out of the ovary

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and the fimbriae could be removed from the mass without sharp dissection. Definitive histological examination confirmed an ovarian pregnancy and revealed that the curettage contained pregnancy endometrium. The patient had an uneventful recovery and was discharged after one day. Her HCG progressively diminished and was negative after one month.

Discussion

Ovarian pregnancy probably exists due to fertilisation outside the ovary followed by implantation within the ovary [8]. There is no agreement as to whether or not the IUD is responsible for an absolute increase in the incidence of ovarian pregnancy [8, 25]. The clinical signs of ovarian pregnancy are diffuse and not characteristic. Besides the atypical appearance, there is the fact that three out of four patients are not aware of their pregnancy [20]. Therefore these ectopic pregnancies can easily be confused with an ovarian germ cell tumour [26]. Especially embryonal carcinoma, choriocarcinoma and polyembryoma all present as a unilateral mass and produce HCG (human chorionic gonadotropin), in addition to other markers (Table 1) [26]. Dysgerminomas also produce HCG but they are bilateral in 10-15% of the cases. Endodermal sinus tumours or immature teratomas on the other hand do not produce HCG. Germ cell malignancies grow rapidly and are often characterised by pain secondary to torsion, haemorrhage, or necrosis. The clinical picture is that of an acute abdomen. Menstrual abnormalities in these cases are regularly seen. However, in women of childbearing age an ovarian mass is most likely to be benign. The most frequent lesions are functional cysts, haemorrhagic corpus luteum, teratoma, cystadenoma or endometrioma. Of special interest is a haemorrhagic corpus luteum. The latter can present as acute abdomen, with a positive HCG and one always has to keep in mind the possibility of an intrauterine pregnancy, because a corpus luteum sustains the pregnancy in the first trimester and removal can lead to pregnancy loss.

Besides the already mentioned diffuse tubal pregnancy – like symptoms, there are also the unexpected symptoms in unusual situations of an ovarian pregnancy such as after a failed midtrimester therapeutic abortion [27], following clomid therapy [28], following ovulation induction with pergonal and in vitro fertilisation [22], within a

cystic teratoma [29], endometriod cyst [30], in association with a contralateral corpus luteum [31], during a staging operation for Hodgkin's disease [20], after vaginal hysterectomy [8] and after bilateral tubal ligation [17]. Combined intrauterine and ovarian pregnancies have been described [2, 27, 28, 32, 33] as have primary ovarian twin pregnancies [34].

There are two possible explanations regarding the development of an ovarian pregnancy: extrafollicular and intrafollicular [35]. In the extrafollicular pregnancy theory implantation is effected on the ovarian surface by a conception which had been normally fertilised and subsequently escaped from the tube to the ovary. The intrafollicular pregnancy theory hypothesises that the ovum is not released from the ovarian follicle but fertilised within the follicle.

For a correct diagnosis the traditional clinico-pathological criteria of Spiegelberg in 1878 must be fulfilled. Rarely, can an intact pregnancy with fetal heart motion (gestational sac) be seen on transvaginal ultrasound [10, 36, 37]. Most ovarian pregnancies (75-90%) rupture in the first trimester, with two-thirds occurring during the first eight weeks [8]. Ruptured ovarian pregnancy leads in most cases to a complex pelvic mass in the Douglas pouch, making the preoperative diagnosis less clear. Direct visualisation of an ectopic pregnancy remains the "gold standard". Therefore, if an ectopic pregnancy is suspected and if there is no emergency then a laparoscopy should be planned both for diagnosis and therapy. It is difficult to distinguish an ovarian pregnancy from the far more common ruptured corpus luteum [39]. Diagnostic laparoscopy for ectopic pregnancy carries a small false-positive (5%) and false negative rate (3%) [40]. If on the other hand the mass is proven to be malignant one can change to laparotomy without compromising the survival of the patient.

Traditionally oophorectomy was performed for ovarian pregnancies [8, 13, 20]. However recently more and more a conservative surgical approach is performed such as ovarian cystectomy or wedge resection, either by laparotomy [13, 14] or by laparoscopy [13, 21, 33, 37]. Today laparoscopic excision is preferred. Conservative surgical management should be the standard of care, especially since tubal function is usually unaffected which gives these young patients a good prognosis for future fertility [5, 16, 18, 20]. More conservative medical management with prostaglandin F2alpha [33, 41] and mifepristone (RU486) [33] and methotrexate [39] have also been described. When medical management is used, there can be circumstances where it is not desirable to take a biopsy of the ovary. This means that the histological Spiegelberg criterion of ovarian tissue containing both trophoblast and ovarian struma can not be fulfilled. Chelmon *et al.* have therefore suggested a modification of the Spiegelberg criteria [39]. Instead of a biopsy which should contain both trophoblast and ovarian stroma they propose two diagnostic categories. First, on laparoscopic examination there has to be an abnormal area which appears to invade the ovary (no biopsy is taken) and second the

Table 1. — Relationship between the various ovarian germ cell tumours and serum markers.

Germ cell tumour	AFP	HCG	LDH	CA-125	CA 19-9	SCC
Dysgerminoma	–	±	+	±	–	–
Endodermal sinus tumour	+	–	±	±	–	–
Immature teratoma	±	–	±	±	±	–
Mature teratoma + Sq ca	–	–	–	–	±	±
Mixed germ cell tumour	±	±	–	±	–	–
Choriocarcinoma	–	+	–	±	–	–
Embryonal carcinoma	±	+	±	±	–	–
Polyembryoma	±	+	±			

SCC = squamous cell cancer antigen; sq ca = squamous cell carcinoma.

serum HCG does not decline after curettage. They suggest that the magnification provided by laparoscopy allows a reliable diagnosis of ovarian invasion. A laparoscopic biopsy of the affected area would probably demonstrate chorionic villi within the ovarian lesion, yet this could cause considerable bleeding, leading to a more extensive procedure. The recurrence rates after spontaneously conceived ovarian pregnancies are exceptionally low and the subsequent pregnancies are almost invariably intrauterine.

In the follow-up of conservatively treated ovarian pregnancy a regular determination of serum HCG levels until zero is essential to detect possible persistent disease.

References

- [1] De Seta F., Baraggino E., Strazzanti C., De Santo D., Tracanzan G., Guaschino S.: "Ovarian pregnancy: a case report". *Acta Obstet. Gynecol. Scand.*, 2001, 80, 661.
- [2] Shahabuddin A.K., Chowdhury S.: "Primary term ovarian pregnancy superimposed by intrauterine pregnancy: a case report". *J. Obstet. Gynaecol. Res.*, 1998, 24, 109.
- [3] Van Tussenbroeck C.: "Un case de grossesse ovarienne". *Ann. Gynecol.*, 1899, 52, 537.
- [4] Melilli G.A., Avantario C., Farnelli C., Papeo R., Savona A.: "Combined intrauterine and ovarian pregnancy after in vitro fertilisation and embryo transfer: a case report". *Clin. Exp. Obstet. Gynecol.*, 2001, 28, 100.
- [5] Ratiel A., Golan A., Pansky M., Ron-El R., Budovsky I., Caspi E.: "Ovarian pregnancy: A report of twenty cases in one institution". *Am. J. Obstet. Gynecol.*, 1990, 63, 1182.
- [6] Ercal T., Cinar O., Muncu A., Lacin S., Ozer E.: "Ovarian pregnancy: relationship to an intrauterine device". *Aust. N. Z. J. Obstet. Gynecol.*, 1997, 37, 362.
- [7] Gaudoin M.R., Coulter K.L., Robins A.M., Verghese A., Harety K.P.: "Is the incidence of ovarian ectopic pregnancy increasing?". *Eur. J. Obstet. Gynecol. Reprod. Biol.*, 1996, 70, 141.
- [8] Grimes H.G., Nosal R.A., Gallagher J.C.: "Ovarian pregnancy: a series of 24 cases". *Obstet. Gynecol.*, 1983, 61, 174.
- [9] Boronow R.C., McElin T.W., West R.H., Buckingham J.C.: "Ovarian pregnancy. Report of 4 cases and a thirteen year survey of the English literature". *Am. J. Obstet. Gynecol.*, 1965, 91, 1095.
- [10] Rizk B., Lachelin G.C., Davies M.C., Hartshorne G.M., Edwards R.G.: "Ovarian pregnancy following in-vitro fertilisation and embryo transfer". *Hum. Reprod.*, 1990, 5, 763.
- [11] Nicholls R.R.: "Ovarian pregnancy with living child and mother". *Am. J. Obstet. Gynecol.*, 1941, 42, 341.
- [12] Williams P.C., Malvar T.C., Kraft J.R.: "Term ovarian pregnancy with delivery of a live infant". *Am. J. Obstet. Gynecol.*, 1982, 142, 589.
- [13] Vasilev S.A., Sauer M.V.: "Diagnosis and modern surgical management of ovarian pregnancy". *Surg. Gynecol. Obstet.*, 1990, 170, 395.
- [14] Acien P., Sanmartin M., Arcas I., Ferrando J., de Francisco-Pavon J.L.: "Primary ovarian pregnancy with intrauterine device in situ". *Eur. J. Obstet. Gynecol. Reprod. Biol.*, 1987, 25, 235.
- [15] Herbertsson G., Magnusson S.S., Benediktsson K.: "Ovarian pregnancy and IUCD use in a defined complete population". *Acta Obstet. Gynecol. Scand.*, 1987, 66, 607.
- [16] Sandvei R., Sandstad E., Steier J.A., Ulstein M.: "Ovarian pregnancy associated with the intra-uterine contraceptive device. A survey of two decades". *Acta Obstet. Gynecol. Scand.*, 1987, 66, 137.
- [17] Chilana G.S., Lev-Gur M., Kim E.S., Greston W.M., Stern W., Kleiner G.J.: "Primary ovarian pregnancy two years after bilateral tubal ligation: A case report". *J. Reprod. Med.*, 1987, 32, 697.
- [18] Schwartz L.B., Carcangiu M.L., DeCherney A.H.: "Primary ovarian pregnancy. A case report". *J. Reprod. Med.*, 1993, 38, 155.
- [19] Rivera F.H., Torres F.J.O., Rodriguez A.F.: "Ovarian Pregnancy: A clinicopathological study of eight cases". *Eur. J. Obstet. Gynecol. Reprod. Biol.*, 1988, 29, 339.
- [20] Hallatt J.G.: "Primary ovarian pregnancy: a report of twenty-five cases". *Am. J. Obstet. Gynecol.*, 1982, 143, 55.
- [21] Van Coevering R.J., Fisher J.E.: "Laparoscopic management of ovarian pregnancy: A case report". *J. Reprod. Med.*, 1988, 33, 774.
- [22] Carter J.E., Jacobson A.: "Reimplantation of a human embryo with subsequent ovarian pregnancy". *Am. J. Obstet. Gynecol.*, 1986, 155, 282.
- [23] Parazzini F., Tozzi L., Ferraroni M., Boccione L., La Vecchia C., Fedele L.: "Risk factors for ectopic pregnancy: an Italian case-control study". *Obstet. Gynecol.*, 1992, 80, 821.
- [24] Spiegelberg O.: "Zur Casuistik der Ovarial Schwangerschaft". *Arch. Gynaekol.*, 1878, 13, 73.
- [25] Gray C.L., Ruffolo E.H.: "Ovarian pregnancy associated with intrauterine contraceptive devices". *Am. J. Obstet. Gynecol.*, 1978, 132, 134.
- [26] Tjalma W.A.A.: "Symptoms, signs, clinical manifestation, tumour markers and clinical diagnosis of the embryonal carcinoma of the ovary". *CME Journal of Gynecologic Oncology*, 2002, 7, 219.
- [27] Ogunniyi S.O., Faleyi B.L., Odesanmi W.O., Fasubaa O.B.: "Ovarian pregnancy causing obstructed labor at term in a heterotopic gestation". *Int. J. Gynaecol. Obstet.*, 1990, 31, 283.
- [28] McLain P.L., Kirkwood C.R.: "Ovarian and intrauterine heterotopic pregnancy following clomiphene ovulation induction: Report of a healthy live baby". *J. Fam. Pract.*, 1987, 24, 76.
- [29] Yu T.J., Iwasaki I., Teratima T., Tanaka T., Aoki M.: "Primary ovarian pregnancy in a cystic teratoma". *Obstet. Gynecol.*, 1984, 64, 52S.
- [30] Bercovici B., Pfau A., Liban E.: "Primary ovarian pregnancy. Report of three cases, one with implantation in an endometrial cyst of the ovary". *Obstet. Gynecol.*, 1958, 12, 596.
- [31] Check J.H., Chase J.S.: "Ovarian pregnancy with a contralateral corpus luteum: Case report". *Am. J. Obstet. Gynecol.*, 1986, 154, 155.
- [32] Fernandez H., DeZiegler D., Imbert M.C., Cambet B., Frydman R., Papiernik E.: "Advanced combined intra-uterine and ovarian gestation: Case report". *Eur. J. Obstet. Gynecol. Reprod. Med.*, 1990, 37, 293.
- [33] Levin J.H., Laccara M., d'Ablaing G., Grimes D.A., Vermesh M.: "Mifepristone (RU 486) failure in an ovarian heterotopic pregnancy". *Am. J. Obstet. Gynecol.*, 1990, 163, 543.
- [34] Panda J.K.: "Primary ovarian twin pregnancy: Case report". *Br. J. Obstet. Gynecol.*, 1990, 97, 540.
- [35] Hirose M., Nomura T., Wakuda K., Ishiguro T., Yoshida Y.: "Combined intrauterine and ovarian pregnancy: a case report". *Asia Oceania J. Obstet. Gynaecol.*, 1994, 20, 25.
- [36] Marcus S.F., Brinsden P.R.: "Primary ovarian pregnancy after in vitro fertilisation and embryo transfer: report of seven cases". *Fertil. Steril.*, 1993, 60, 167.
- [37] Russell J.B., Cutler L.R.: "Transvaginal ultrasonographic detection of a primary ovarian pregnancy with laparoscopic removal: a case report". *Fertil. Steril.*, 1989, 51, 1055.
- [38] Sandberg, E.C.: "Ovarian pregnancy". In: "Extrauterine Pregnancy", Langer, A. and Iffy, L. (eds.), Littleton, MA: PSG Publishing Co., 1986, 245.
- [39] Chelmsow D., Gates E., Penzias A.S.: "Laparoscopic diagnosis and methotrexate treatment of an ovarian pregnancy: a case report". *Fertil. Steril.*, 1994, 62, 879.
- [40] Varma R., Mascarenhas L.: "Evidence-based management of ectopic pregnancy". *Current Obstet. Gynaecol.*, 2002, 12, 191.
- [41] Koike H., Chuganji Y., Watanabe H., Kaneko M., Noda S., Mori N.: "Conservative treatment of ovarian pregnancy by local prostaglandin F_{2α} injection". *Am. J. Obstet. Gynecol.*, 1990, 163, 696.

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