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CLINICAL PRACTICE

Bilateral ovarian laparoscopic cystectomy of dermoid cysts and pregnancy

Ana Pascual-Pedreño · Carlos Moreno-Sanz · María Moreno-Cid · Eduardo Rodríguez-Rodríguez

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Abstract Significant ovarian masses complicate 0.2% to 2% of pregnancies. Although the risk of malignancy is low, complications resulting from distention, rupture and/or torsion of the adnexa can be a significant concern. As laparoscopic procedures improve and our experience with laparoscopy in pregnant women increases, more and more patients with these complications find that they can forego laparotomy and manage their condition safely through laparoscopic removal of the mass. The subject of the case study presented here was a 39-year-old woman diagnosed with bilateral adnexal masses during the first trimester of pregnancy. A bilateral ovarian laparoscopic cystectomy was performed at 16 weeks with a favourable outcome. The pathological diagnosis was "mature cystic teratoma" on both sides. This case demonstrates that laparoscopic surgery can be performed safely and effectively in pregnant women with an adnexal mass.

Keywords Ovarian dermoid cyst · Laparoscopy · Pregnancy

A. Pascual-Pedreño (✉) · M. Moreno-Cid · E. Rodríguez-Rodríguez
Department of Obstetrics and Gynaecology,
"Mancha-Centro" General Hospital,
Avda. Constitución, 3, Alcázar de San Juan,
13600 Ciudad Real, Spain
e-mail: ginemancha@hotmail.com

C. Moreno-Sanz
Department of General Surgery,
"Mancha-Centro" General Hospital,
Avda. Constitución, 3, Alcázar de San Juan,
13600 Ciudad Real, Spain

Introduction

The majority of ovarian tumours discovered during pregnancy are benign, mostly corpora lutea. Generally asymptomatic, they are usually discovered during routine clinical or ultrasound examinations and almost invariably disappear spontaneously as the pregnancy progresses. In fact, by 16–20 weeks, they are present in only 0.3% of pregnancies. Most other ovarian masses discovered during pregnancy are benign dermoid cysts which account for 20–40% of ovarian neoplasms [1–3].

The advantages of laparoscopic surgery are similar for both pregnant and non-pregnant women. Nevertheless, this procedure had been avoided during pregnancy because of concerns that it could be harmful to the foetus. However, the evidence accumulated over the last decade [4–10] suggests that the clinical outcomes of this technique are equivalent to those of open surgery, but with all the advantages of the laparoscopic approach. This paper outlines the case of a pregnant woman diagnosed with bilateral dermoid cysts which was successfully managed with laparoscopic surgery. A PubMed search yielded no results for "bilateral dermoid ovary pregnancy laparoscopy," making this, to the best of our knowledge, the first published case study of a pregnant woman with bilateral dermoid cysts which were successfully removed with the aid of laparoscopic techniques.

Case report

The subject was a 38-year-old woman, gravida 2, para 1-0-0-1, whose ultrasound findings in the first trimester revealed a singleton foetus with a crown–rump length of 52.8 mm, consistent with a gestational age of 12 weeks, and

a 48×53-cm right adnexal cystic mass with multiple small round spheres and a 45×101 homogenous echogenic mass in the left ovary (Figs. 1 and 2). No extra fluid was noted in the pelvic cavity.

It was decided that diagnostic laparoscopy would be performed at 16 weeks of gestation. Hasson's open approach was used to enter the peritoneal cavity, with the first trocar being inserted in the umbilical midline 6 cm above the uterine fundus and three working trocars (supra-umbilical and in both iliac fossae; Fig. 3). Resection of the right and left adnexal masses with preservation of as much ovarian tissue as possible was performed (Figs. 4 and 5). Before surgery, the ovary was placed in a retrieval bag to prevent spillage of the endocystic contents while the cysts were removed from the abdomen.

There were no postoperative complications and the patient left the hospital 48 h after the operation.

The final pathological diagnosis was "mature cystic teratomas" on both sides.

The pregnancy continued undisturbed and ended at 38+5 weeks with the instrumental delivery of a normal-weight male baby, with a 1- and 5-min Apgar score of 7–10 and with an umbilical cord blood (arterial–venous) pH of 7.28–7.31.

Discussion

The incidence of adnexal masses during pregnancy comprises 2% of all cases, with most of the masses discovered during the first trimester being functional cysts that resolve spontaneously. Persistent masses are most commonly functional cysts or dermoid cysts [1–3]. Surgical intervention is indicated in persistent adnexal masses ≥6 cm,

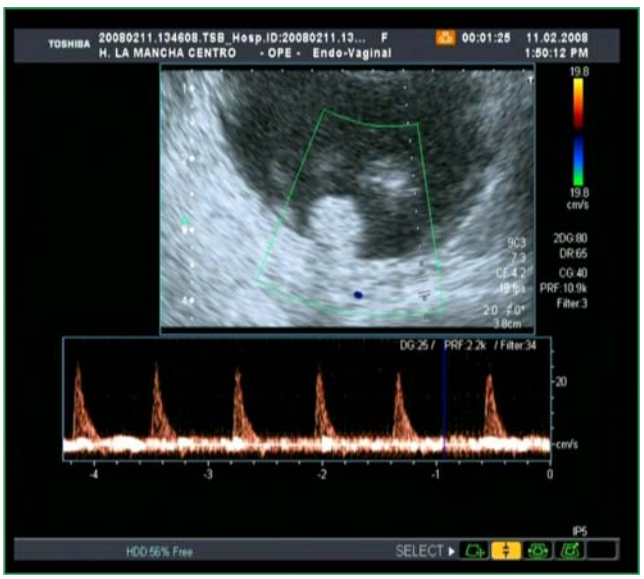

Fig. 1 Vaginal ultrasound of right ovary

Fig. 2 Abdominal ultrasound of left ovary

adnexal masses of any size if malignancy is suspected or if torsion, rupture or haemorrhage is at all likely [3, 11].

The discovery of dermoid cysts during pregnancy poses the problem of weighing the risks of surgery versus the risks of a persistent adnexal mass. The most serious complications are rupture, which can result in chemical peritonitis and torsion, both of which require an emergency operation with a much higher surgical risk. Malignancy is another potential risk. As our patient was asymptomatic, after explaining the risks and benefits to her, we decided to proceed with diagnostic laparoscopy. Previous authors have

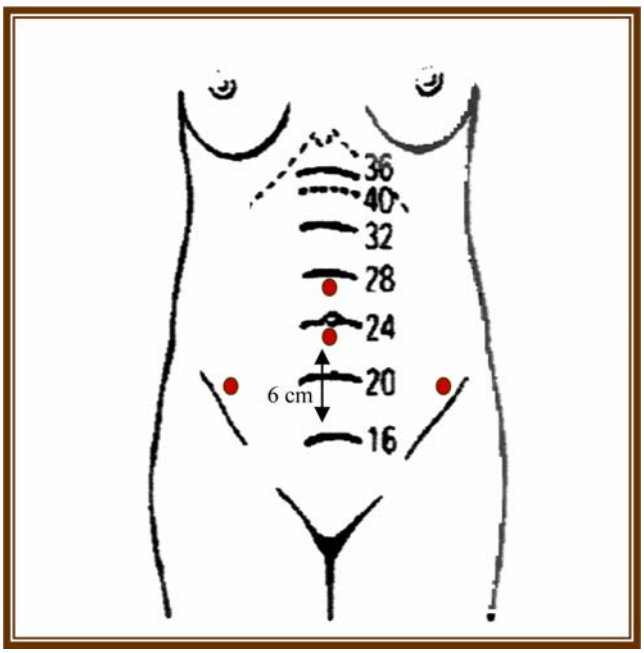

Fig. 3 Port placement

Fig. 4 Right ovary

demonstrated that laparoscopic removal of ovarian dermoid cysts during pregnancy is a safe procedure [12–15].

The benefits of laparoscopy during pregnancy are similar to those in non-pregnant patients and include less postoperative pain, less postoperative ileus, reduced adhesion formation, shorter hospital stays and a faster return to normal activities. Specific benefits during pregnancy may include decreased foetal depression due to lower postoperative narcotic requirements, lower risk of wound complications, diminished postoperative maternal hypoventilation and, because of early mobilisation, decreased risk of thromboembolic events. Laparoscopy also reduces the risk of uterine irritability by decreasing intraoperative uterine manipulation because of better visualisation. Prospective studies evaluating the safety of laparoscopy during human pregnancy are lacking, but multiple case series have reported laparoscopic procedures in all trimesters of pregnancy with minimal morbidity to the foetus and mother and without significant differences between groups in any measured outcome: birth weight, gestational duration, intrauterine growth restriction, congenital malformations, stillbirths or neonatal deaths [4–6, 16].

Fig. 5 Left ovary

Laparoscopy can be safely performed during any trimester of pregnancy [6]; however, as with other types of surgery performed during pregnancy, the optimal time to operate is in the early second trimester because the size of the uterus allows for adequate visualisation; the period of spontaneous miscarriages is past, and prenatal diagnostic has already been carried out. Taking all this into consideration, we decided to postpone surgery from the first to the second trimester.

Both preoperative and postoperative monitoring of the foetal heart rate is highly recommended [6]. We performed an ultrasound assessment of the foetal heart rate immediately before and the day after the procedure.

The gravid uterus makes trocar insertion and the creation of pneumoperitoneum more difficult and potentially more hazardous; indeed, inadvertent placement of a Veress needle through the umbilicus into the pregnant uterus has been described [5, 17]. Initial access can be safely accomplished with an open technique (Hassan), Verres needle or an optical trocar technique in which the location is adjusted to the fundal height (at least 6 cm above the uterine fundus), any previous incisions and the experience of the surgeon. At increased gestational age, the use of the subxiphoid, left upper quadrant or right upper quadrant insertion points can also help to avoid the enlarged uterus. In our opinion, given the feasibility of both methods, each surgeon should use the technique with which he has the most experience. We prefer to use an open-entry technique because it provides a greater assurance of safety, and we adjust the placement of trocars according to fundal height, inserting them under direct visualisation.

Pneumoperitoneum can alter maternal haemodynamics, arterial oxygenation and acid–base balance as a result of CO_2 absorption, pressure on uteroplacental vessels and upward displacement of the diaphragm (which further reduces maternal residual lung volume and functional residual capacity). Haemodynamic changes include decreases in the cardiac index and increases in mean arterial pressure and systemic vascular resistance [8]. Animal models, which have been used to evaluate the maternal and foetal effects of the increased intra-abdominal pressure associated with CO_2 pneumoperitoneum, have shown that there are no long-term adverse effects. Even more importantly, there is no evidence to indicate any long-term detrimental effects resulting from CO_2 pneumoperitoneum in humans [18–22]. Even though intra-abdominal pressure needs to be sufficient to allow for adequate working space, maintenance of a low pressure is mandatory, given the possible adverse effects of increased intra-abdominal pressure on the haemodynamic and respiratory physiology of the gravid patient. Pressures up to 15 mmHg have been implemented in pregnant patients without an increase in adverse outcomes to either the patient or the foetus [23, 24], but in general, an intra-

abdominal pressure between 10 and 15 mmHg should be maintained [5, 6]. We chose to maintain an intra-abdominal pressure of 14 mmHg and operated as efficiently as possible to minimise the operative time (75 min) and any potential maternal/foetal morbidity.

Initially, there was debate over the maternal blood gas monitoring of arterial carbon dioxide ($PaCO_2$) versus end-tidal carbon dioxide ($ETCO_2$). The end-tidal carbon dioxide pressure (capnography) is less invasive and is adequate for intraoperative CO_2 monitoring in pregnant women. The recommended end-tidal CO_2 level is between 32 and 34 mmHg, as respiratory acidosis has not been reported at this level [25, 26].

There are no data from randomised trials on the use of unfractionated or low molecular weight heparin or intermittent pneumatic compression for venous thromboembolism prophylaxis in pregnant patients undergoing laparoscopy. In 2008, the Society of American Gastrointestinal and Endoscopic Surgeons recommended placing pneumatic compression devices on the lower limbs of pregnant women undergoing laparoscopic procedures [6], and there are several compelling reasons why pneumatic compression devices or pharmacologic thromboprophylaxis should be considered. Although abdominal wall tissue trauma is decreased with a laparoscopic approach, activation of the coagulation system, which is already slightly activated in pregnant women, is similar for laparoscopy and laparotomy. Immobilisation can be lengthy, as laparoscopic procedures may be as long as or longer than open surgeries; many "major" surgical procedures (i.e. in which the cavity is entered and organs are removed or normal anatomy is significantly altered) are performed through a laparoscope. Lastly, the use of pneumoperitoneum contributes to venous stasis and, possibly, thrombosis. For these reasons, we choose to use thromboembolic prophylaxis with low-weight heparin on all pregnant women undergoing laparoscopic surgery.

There is no evidence to support the use of prophylactic tocolytics or glucocorticoids, but they should be considered perioperatively if signs of preterm labour are present [6].

Caesarean delivery is performed for standard obstetric indications; the presence of a recent abdominal incision does not preclude pushing in the second stage of labour.

In summary, although there are no standardised and controlled comparative studies in this field to date, our experience suggests that laparoscopic surgery can be performed safely and effectively in pregnant women with adnexal masses. Laparoscopy during pregnancy not only offers all the normal advantages associated with this surgical technique, but it is also an excellent diagnostic and therapeutic tool in patients in which a delay in diagnosis and treatment can increase the rate of maternal–foetal complications.

Conflict of interest There is no actual or potential conflict of interest in relation to this article.

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