Uterine artery embolization for management of interstitial twin ectopic pregnancy: Case report

E.Ophir1,3, J.Singer-Jordan2, M.Oettinger1, M.Odeh1, R.Tendler1, Y.Feldman1, V.Fait1 and J.Bornstein1

Departments of 1Obstetrics and Gynecology and 2Angiography, Western Galilee Hospital, PO Box 21, Nahariya, 22100, and Rappaport Faculty of Medicine, Technion University, Haifa, Israel

3To whom correspondence should be addressed. E-mail: oella@naharia.health.gov.il

Interstitial pregnancy is rare and dangerous variation of ectopic pregnancy. We describe a case of unilateral interstitial viable twin pregnancy treated by selective uterine artery embolization. A 23-year-old women with clinical and ultrasonic diagnosis of viable twin interstitial pregnancy was treated by selective uterine artery embolization after failure of systemic methotrexate treatement. Her serum β-HCG was undetectable 2 months after the procedure and the ultrasound scan 70 days after embolization showed only multiple echogenic spots in the right uterine cornua. This therapeutic modality seems to be effective for conservative management of interstitial ectopic pregnancy, and as a prophylactic measure before surgical intervention to prevent major bleeding.

Key words: interstitial pregnancy/twins/uterine artery embolization

Introduction

Interstitial pregnancy is a rare condition, accounting for 2–6% of all ectopic pregnancies, with an incidence of 1 per 2500–5000 live births. The mortality rate is 2–2.5% (Rock and Damario, 1997).

The vascular supply of the interstitial area is particularly rich. Interstitial pregnancy is usually diagnosed at a later stage than tubal pregnancies. For these two reasons, conservative therapy has only rarely been applied in the past. Traditional treatment has been interstitial resection by laparotomy or hysterectomy. Recently, however, the development of more sensitive assays for β-HCG and early ultrasound examination allow the early diagnosis of intact interstitial pregnancy in many cases (Hafner et al., 1999). Subsequently, more conservative medical and surgical treatment methods could be used.

The choice of treatment for interstitial pregnancy should depend on the patient’s interest in preserving her childbearing function. Non-invasive treatment modalities include local and systemic methotrexate (MTX) therapy (Fernandez et al., 1991; Karsdrop et al., 1992), and prostaglandin or potassium chloride injection of the ectopic mass under sonographic or laparoscopic guidance (Oelsner et al., 1993; Batioglu et al., 1997).

Successful endoscopic treatment has been described using hysteroscopy (Sanz and Verosko, 2002; Pal et al., 2003) or laparoscopy: laparoscopic cornuostomy (Tulandi and Vilos, 1995; Katz and Lurie, 1997) or laparoscopic application of an endoloop or fibrin glue (Woodland et al., 1996; Morita et al., 1997; Moon et al., 2000).

In this report we present our experience with embolization of the uterine arteries in the treatment of a viable twin interstitial pregnancy.

Case report

A 23-year-old married woman, G5 P1 Ab3, was first seen at the gynecologic emergency department of the Western Galilee Hospital with a history of 6 weeks amenorrhea, slight vaginal bleeding and low abdominal pain of 3 days duration. Her menses had been regular, every 26–28 days, with the last being 6 weeks prior to presentation. Her medical and gynecological history was unremarkable. Her obstetrical history was significant for one normal delivery and three early spontaneous miscarriages. Upon examination in the emergency room the patient’s vital signs were stable, and general physical examination was unremarkable.

Pelvic examination upon admission revealed a slightly enlarged tender uterus with no irregularities in shape observed. No adnexal masses were detected. Transvaginal ultrasound demonstrated an empty uterus with an endometrium 17-mm thick. A gestational sac ~1.8 × 2.4 cm in diameter, with two small fetal poles and fetal heart movements in each fetal pole, was observed in the right uterine interstitial area. The sac was clearly surrounded by an asymmetric myometrial mantle (Figure 1). The ultrasound diagnosis of interstitial pregnancy was made by the diagnostic criteria suggested by Hafner et al. (1999). Serum β-HCG on admission was 33,689 mIU/ml. The patient was informed of the situation, and in an attempt to preserve fertility, despite presence of fetal cardiac activity, in light of patient’s previous history of three...
spontaneous miscarriages and her strong desire to avoid surgery, we considered conservative management. Because \( \beta \)-HCG returns to non-pregnant levels faster with MTX (Timor-Tritsch et al., 1992) and because local treatment with potassium chloride has been reported only in cases of heterotopic interstitial pregnancy (Benifla et al., 1996), a decision was made to treat the patient with intramuscular MTX.

The patient’s liver function tests were within normal limits. She was administered 88 mg (50 mg/m²) MTX intramuscularly. Serum \( \beta \)-HCG level increased to 49 558 mIU/ml 5 days after injection (Figure 2). At that time, ultrasound examination showed no change in the size of the gestational sac. Fetal heart activity of both fetuses was apparent.

The patient received a second MTX injection of the same dose (Figure 2). Her \( \beta \)-HCG serum level increased to 51 098 mIU/ml on day 5 after second injection. Ultrasound examination showed the gestational sac to be \( \sim 2.3 \times 2.5 \) cm in diameter, with two fetuses with crown–rump length 3.5 and 4.1 mm, with persistent fetal cardiac activity of both fetuses.

The rising level of \( \beta \)-HCG and the continuing growth of the fetuses as shown by the serial ultrasound examinations called for additional treatment. However, the patient refused any surgical intervention; therefore, we proceeded with uterine artery embolization.

In the angiography suite, under local anesthesis, a 4F sheath was placed in the right common femoral artery. The uterine arteries were successfully catheterized with 4F catheters (Cook Inc., Bloomington, Indiana, USA), and in each case embolized with Gelfoam pledgets 0.5–1.0 mm in diameter (Pharmacia & Upjohn Co., Kalamazoo, Michigan, USA). The pledgets were injected several at a time, suspended in dilute contrast medium under fluoroscopy, allowing precise embolization until the branches of both uterine arteries had been occluded (Figure 3).

During the days following embolization, the patient complained of abdominal and low back pain. Serum \( \beta \)-HCG level decreased to 43 391 mIU/ml on the second day after the procedure (Figure 2). Ultrasound examination on that day showed the gestational sac with two fetal poles, but no fetal heart activity. The patient was discharged in good condition 1 week after procedure. Her serum \( \beta \)-HCG level decreased to 21 688 mIU/ml 1 month later, to 1054 mIU/ml on day 55, and was undetectable 2 months after the procedure (Figure 2).

Ultrasound examination demonstrated a collapsed empty gestational sac 1 month after the procedure. The ultrasound scan 70 days after embolization showed only multiple echogenic spots in the right uterine cornua. The patient had an unremarkable abdominal and gynecological examination. She menstruated 8 weeks after the procedure.

### Discussion

This is the first report, to the best of our knowledge, of interstitial pregnancy managed by bilateral angiographic uterine artery embolization, although 26 cases of abdominal and cervical pregnancies treated with arterial embolization of either the internal, iliac, hypogastric or uterine arteries have been reported in the literature between 1988 and 2001 (Badawy et al., 2001; Dilbar et al., 2001).

Interstitial pregnancy is a rare form of ectopic pregnancy, but is a cause of significant maternal morbidity and mortality. Unique to interstitial pregnancy is the location of the gestational sac in a highly vascular area, near the anastomosis of the uterine and ovarian vessels. Rupture and/or surgical intervention in this area may result in catastrophic haemorrhage because of its rich blood supply. The treatment modalities of this condition can be conservative or surgical.

The use of systemic MTX results in resolution of a certain percentage of these pregnancies; however, in some cases, haemorrhage occurs following MTX treatment, necessitating...
emergency treatment (Voight et al., 1994). Local injection of MTX is also not without risk, as puncturing the gestational sac may lead to haemorrhage (Fernandez et al., 1991). Prophylactic haemostatic procedure has been suggested by Confino and Gleicher (1989), who recommend ‘mesosalpingeal haemostasis’. This procedure involves ligation of the ascending uterine artery, the ovarian ligament, the anastomotic branch of the tubal artery, and the area of myometrium above and below the pregnancy location.

The use of diluted intramyometrial vasopressine at the commencement of the operation has been proposed to minimize blood loss (Meyer and Mitchell, 1989). Others used a suture-loop tourniquet to minimize bleeding (Katz and Lurie, 1997). Several laparoscopists have used an endo-loop (Katz and Lurie, 1997) or a stapler (Moon et al., 2000) to achieve haemostasis of the proximal cornual region before the procedure. Others have described ligation of the ascending branches of the uterine vessels (Tulandi and Vilos, 1995). Uterine artery embolization is a technique that has been described for control of various gynecological and obstetric bleeding conditions (Badawy et al., 2001).

In our case, systemic administration of MTX failed to induce a decrease of β-HCG serum concentration after 10 days of therapy, and heart beats of both fetuses were evident. Owing to failure of medical treatment, we decided to employ angiographic embolization of the uterine arteries, a treatment modality already proposed for the successful management of cervical pregnancy (Yitzhak et al., 1999; Dilbar et al., 2001).

The mechanism of endovascular embolization is to block the flow of blood in the designated vessel (Hansch et al., 1999) and decrease vascularity at pregnancy, leading to trophoblastic degeneration.

Gelfoam embolization considerably reduces circulation in the catheterized region for ~24 h (Simon et al., 1991). Embolization by Gelfoam provides temporary occlusion of the vessels for 2–6 weeks. It is interesting to consider why the embolization of the uterine artery alone, without the embolization of the ovarian artery, leads to decrease of vascularization of pregnancy mass and missed interstitial pregnancy. Possibly, the ovarian artery sends only small vessels to the area, so that the uterine cornua receives its blood supply mainly from the uterine artery (De Lancey, 1997).

On the second postoperative day, uterine ultrasound scan showed cessation of fetal heart beats of both fetuses, and serum β-HCG level decreased from 51 098 to 43 991 mIU/ml, and then to zero 2 months after procedure.

The complications and effects of the procedure on menses and subsequent pregnancies are not clear, as this is the first report of its kind. However, selective uterine artery embolization for non-surgical management of uterine myoma (Goodwin et al., 1999) leads to complications in three categories: complications from angiography, pelvic infection and ischaemic phenomena. These rare sequelae include groin haematoma, acute endometritis, tubo-ovarian abscess, transient or permanent amenorrhoea, and local pain and transient febrile episode (Stancato-Pasik et al., 1997).

The rationale of this procedure was that by decreasing the uterine circulation, placental function and fetal growth would be detrimentally affected.

Several studies have reported subsequent pregnancies following bilateral uterine artery embolization for post partum haemorrhage, cervical pregnancy and arterio-venous malformation, without causing of fetal growth restriction (Gopal et al., 2003; Ornan et al., 2003; Wang and Carmel, 2003).
The later development of collateral uterine circulation appears to be adequate in preventing uteroplacental insufficiency in subsequent pregnancies. There are reports of the conservation of reproductive capacity in women who have undergone bilateral ligation of internal iliac and ovarian arteries, demonstrating the extensive collateral supply to the gravid uterus (Mengert et al., 1969).

Many studies have suggested that women who undergo uterine artery embolization can expect a return of normal menses with no adverse effect on fertility (Stancato-Pasik et al., 1997). The successful outcome of our case suggests that angiographic embolization of uterine arteries may be useful in the treatment of interstitial pregnancy. It is also possible that prophylactic embolization before surgical intervention in cases of interstitial pregnancy, to prevent major bleeding, should also be considered.

References


Submitted on January 5, 2004; accepted on April 16, 2004