Menses, fertility and pregnancy after arterial embolization for the control of postpartum haemorrhage

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BACKGROUND: The long-term effects of uterine artery embolization for the control of postpartum haemorrhage on menses, fertility and future pregnancy evolution have not been assessed. METHODS: Between November 1993 and July 1999, 31 women with obstetric haemorrhage underwent arterial embolization. Four patients underwent a hysterectomy. Gynaecological information on 25 of the 27 patients who did not undergo hysterectomy was obtained by interview. RESULTS: All women had a return of normal menses. Nine of the 25 patients desired subsequent pregnancy and five patients became pregnant with normal delay of conception. Moreover, two other patients who did not plan another pregnancy became pregnant. A total of 10 pregnancies was studied, four ended during the first trimester. For the six others, the maternal evolution of the pregnancy was uneventful until term. No case of pre-eclampsia was observed. The ultrasonographic examinations revealed normal fetal growth and umbilical and uterine Doppler studies showed no anomaly. No repetition of obstetric haemorrhage was observed. All full-term, newborns were healthy, weighing from 3220 to 4100 g. CONCLUSION: Our results suggest that women who undergo arterial embolization for obstetric haemorrhage should expect to have a return of normal menses with preservation of future fertility and successful uneventful pregnancies.

Key words: embolization/fertility/menstrual cycle/obstetric haemorrhage/pregnancy

Introduction

Postpartum haemorrhage remains a major cause of maternal mortality throughout the world (Atrash et al., 1995; Bouvier-Colle et al., 1995). In most cases, primary postpartum haemorrhage can be managed with conservative treatment involving vaginal packing and administration of uterotonic drugs. In cases of persistent bleeding, vascular ligation or hysterectomy may be required with risk of surgical complications including infection, bleeding, and ureteral injury (Clark et al., 1985; Chattopadhyay et al., 1990). Transcatheter embolization to control postpartum bleeding, initially described by Brown et al. (1979), represents an interesting alternative procedure. Several authors have reported the usefulness of this technique as first-line treatment for postpartum bleeding, refractory to conservative local treatment (Vedantham et al., 1997; Pelage et al., 1998). The efficacy and immediate safety of this conservative technique has been demonstrated. However, data regarding the long-term effect on the menstrual cycle, reproductive capacity and evolution of the future pregnancy remain scarce.

The aim of this study was to describe the long-term effects of uterine artery embolization for the control of postpartum haemorrhage on menses, fertility and future pregnancy evolution.

Materials and methods

Between November 1993 and July 1999, 31 women were treated with uterine artery embolization. The procedure was performed with a 5Fr Cobra-catheter via a femoral artery approach. Embolization of both uterine arteries was carried out preferentially with pledgets of absorbable gelatine sponge (Gelfoam; Upjohn, USA), as well as with embolization microspheres (Biosphere Medical, France), fibred steel coil (Cook Europe, Denmark) or fibred platinum microcoils (Target Therapeutics, Boston Scientific, USA).

Twenty-nine women who did not respond to routine medical treatment were treated in emergency for life-threatening obstetric haemorrhage. In two women, uterine embolotherapy was performed for prophylaxis of bleeding, after childbirth and before removal of the placenta, in cases of placenta accreta or percreta.

Four of the 31 patients were excluded from our follow-up study because they underwent hysterectomy for uncontrolled haemorrhage. For the remaining 27 women, attempts were made to contact the patient directly. We were able to contact 25 patients, who were asked about menstrual cycle, desire to become pregnant and conception delay. In cases of future pregnancy, we compared maternal clinical...
Results

All the 25 patients who were contacted directly described normal postpartum menses within a normal delay, according to the presence or not of breastfeeding (in women who did not breastfeed, menses normally recurred between 6 and 8 weeks after delivery).

More than 1 year after the delivery and the procedure, three patients described less abundant menses, and four others more irregular menstrual cycles. For all other patients, the menstrual cycle was unchanged.

Nine of the 25 patients desired subsequent pregnancy. Five patients (patients 1–5 in the Table I) became pregnant with normal delay of conception (2–14 months). One patient was lost to follow-up although this patient expressed her wish, during the previous 6 months, to become pregnant (patient 6).

For the three others, two presented a history of sterility (patients 7 and 8) and one progressive Crohn’s disease which reduces fertility (patient 9), which may explain the absence of pregnancy.

Moreover, during the follow-up period, two other patients (patients 10 and 11) who did not plan pregnancy became pregnant. One patient decided to have an abortion and the other continued a normal course of pregnancy.

Ten pregnancies were detected in the 25 patients. Four of these pregnancies ended during the first trimester: three miscarriages (cases 5, 7 and 8) and one abortion (case 15). For the six others (cases 1, 2, 3, 4, 6 and 14), the maternal evolution of the pregnancy was uneventful until term. No case of pre-eclampsia was observed. The ultrasonographic examinations revealed normal fetal growth and the studies of umbilical and uterine Doppler showed no anomaly. Three patients had normal vaginal delivery; for the three others, a Caesarean section was necessary for obstetric reasons (multi-scarred uterus or breech presentation or placenta praevia). No repetition of obstetric haemorrhage was observed. All full-term newborns were healthy, weighing from 3220 to 4100 g (Table I).

Discussion

Uterine artery embolization is a relatively recent procedure performed in obstetrics. However, several series reported in the literature have not fully assessed long-term follow-up (Mitty et al., 1993; Pelage et al., 1999a). Only Stancato-Pasik et al. (1997) attempted to study the effect on menses and pregnancy of obstetric embolotherapy.

For the evaluation of the effect of embolization on menstrual cycle, Stancato-Pasik et al. observed a return of normal menses, 3–8 months later, for all but one of 12 women treated with uterine artery embolization for postpartum haemorrhage. In our series, similarly, all the 25 patients observed return of normal cycle but only two with moderate modification as compared to the period prior to delivery and procedure.

The effect on fertility has not specifically been evaluated in the literature. In our study, fertility was estimated as normal with normal conception delay for the nine patients who desired subsequent pregnancy. For the three patients who did not become pregnant, the patient’s medical history may explain the abnormally long delay. Furthermore, two undesired pregnancies were observed for the two other patients.

Our experience, in relation to the pregnancies after pelvic embolization, remains limited to six pregnancies. This small patient population was explained by the fact that the first embolization treatment was only carried out in 1993 and, at this time, patients were extremely reluctant to experience a further pregnancy. This was apparently due to their psychologically traumatic experience. However, as regards cases mentioned in the literature (Table II), to our knowledge only five pregnancies after uterine artery embolization for postpartum haemorrhage have been reported (Casele et al., 1997; Stancato-Pasik et al., 1997; Pelage et al., 1999b). Three pregnancies among 12

<table>
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<tr>
<th>Patient no.</th>
<th>Case no.</th>
<th>Delay of conception (months)</th>
<th>Clinical evolution</th>
<th>Echo + Doppler</th>
<th>Mode of delivery</th>
<th>Term (weeks gestation)</th>
<th>Weight (g)</th>
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patients treated with uterine artery embolization for postpartum haemorrhage were reported by Stancato-Pasik et al.; in all three cases, the women desired subsequent pregnancy. The evolution of pregnancy was not detailed but these authors reported that the patients delivered healthy, full-term newborns. Fertility for these patients was considered normal. Casele et al. reported a spontaneous pregnancy 6 months after artery embolization with gelatine sponge pledgets, for postpartum haemorrhage after elective Caesarean section of triple pregnancy. They
observed interruption of the fetal growth between 32 and 35 weeks gestation and pathological umbilical Doppler, but no uterine Doppler was reported. Induction of labour was decided upon but a Caesarean section was carried out because there was no progression in the presentation. An eutrophic newborn was delivered, weighing 2921 g. Among the 51 cases of uterine artery embolization for postpartum haemorrhage reported by Pelage et al., only one patient presented a full-term pregnancy. No information on the evolution of pregnancy or the weight of the newborn was specified.

By extending our review of the literature to the pregnancies that occurred after uterine artery embolization for arteriovenous malformation (Forssman et al., 1982; Chapman et al., 1985; Poppe et al., 1987; Tacchi et al., 1988; Wilms et al., 1990; Abbas et al., 1994; Chow et al., 1995; Gaens et al., 1996; Zanetta et al., 1997), cervical ectopic pregnancy (Frates et al., 1994; Pattinson et al., 1994), trophoblastic disease (McIvor et al., 1996) and cervical biopsy (Greenwood et al., 1987) permitted us to enumerate 17 more reported cases of pregnancy that occurred after uterine embolization.

Among the five pregnancies reported in the literature obtained after uterine artery embolization for postpartum haemorrhage, none had premature birth. In our own series, all childbirths reached full term. In the 17 consecutive pregnancies with a gynaecological embolization indication, the term of delivery was not specified in seven cases, childbirth was at full term for five cases, and prematurely for five cases. The term of the premature births varied from 30 to 33 weeks. All the mothers of the children born prematurely had an embolization for arteriovenous malformation.

Poppe et al. (1987) have been the only authors who reported a study of uterine and umbilical Dopplers. Their patient, who benefitted from embolization of the two uterine arteries (partial on the right and complete on the left); presented a normal Doppler during the subsequent pregnancy. In our series, the Doppler indices were normal for all patients in the area of uterine artery at 24 weeks, and in the umbilical artery at 33 weeks gestation, which suggests the good quality of the fetoplacental exchanges.

Among the 17 pregnancies obtained after uterine artery embolization due to gynaecological indication, the birthweight, which was only specified six times, was normal in five cases and hypotrophic in only one case. These results are in agreement with the expected effect of absorbable material utilization for the embolization. This reabsorption permitted revascularization of the uterine artery, which was confirmed on angiographic follow-up (Figures 1 and 2). Furthermore, this reabsorption appears to occur without deterioration of the vascular endothelium in the embolized site if uterine Doppler results accurately reflect normality. No albuminuria or increase in blood pressure values were observed at the follow-up in the six pregnancies of our series.

Abbas et al. (1994) reported a complicated twin pregnancy with in-utero death of one of the twins at 18 weeks gestation and pre-eclampsia, which occurred at 26 weeks. The weight at birth at 30 weeks gestation was not reported. Previous embolization of the two hypogastric arteries by particles of Gelfoam and coils was promptly by arteriovenous malforma-

tion. However, it would be difficult to cite embolization as the sole aetiology of the pre-eclampsia in patients with in-utero death of one of the twins.

Uterine artery embolization provokes obliteration and therefore reduction of uterine perfusion may occur. Therefore, in cases of pregnancy, uterine hypovascularization could affect placentation, fetoplacental exchanges and subsequently fetal growth. Vascular complications, e.g. pre-eclampsia and intrauterine growth retardation, could be expected and therefore an alteration of uterine wall quality was expected. However, this complication was not found in our series. To our knowledge, no complications of this type have previously been reported in the literature. This fact suggests a persistent uterine perfusion with low pressure. The embolization did not cause a total obstruction of the vascular lumen. When the embolization was performed at the area of the internal iliac arteries, the perfusion was maintained by means of the collateral system, which is immediately functional. Therefore Pais et al. (1980) observed the absence of embolization repercussion on the hysterectomy specimen of a patient who had a bilateral embolization of the internal iliac arteries; the histological study do not reveal any characteristics of ischemia.

Our results, as well as the cases reported in the literature, suggest that both menstrual cycle and fertility can be preserved following uterine artery embolization. Only one case of intrauterine growth retardation with umbilical anomaly on Doppler was reported among the five pregnant patients after a embolization for postpartum haemorrhage (Casele et al., 1997). In this case, the embolization was carried out in the area of internal iliac arteries. The three other obstetric complications related to pregnancies occurred after embolization of uterine arteriovenous malformation, and they included an intrauterine growth retardation <3rd percentile (Chapman et al., 1985), a small placenta due to listeria (Tacchi et al., 1988) and a pre-eclampsia which could have been the complication of in-utero death of one of the twins (Abbas et al., 1994).

In conclusion, the various advantages of arterial embolization in cases of postpartum haemorrhage have been clearly established: it is safe, non-invasive, reproducible, with a low rate of complications. Furthermore, the results of this study seem to show that women who undergo arterial embolization can expect a return of normal menses with no adverse effects on fertility. As regards pregnancy, patients should be able to look forward to a normal pregnancy. These results are encouraging but we may not draw firm conclusions because of the small number of patients.

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References
Embolic treatment for obstetric haemorrhage


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