Fertility after embolization of the uterine arteries to treat obstetrical hemorrhage: a review of 53 cases

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Objective: To study subsequent fertility of patients who underwent embolization of the uterine arteries to treat postpartum hemorrhage.
Design: Retrospective cohort study between January 2000 and June 2006 with two patient groups: exposed and nonexposed to embolization for postpartum hemorrhage.
Setting: Level 3 maternity unit.
Patient(s): Fifty-three patients exposed to embolization and 106 nonexposed patients were included and paired according to several criteria: date of delivery, age, parity, whether the pregnancy was spontaneous or with fertility assistance, and mode of delivery.
Intervention(s): None.
Main Outcomes Measure(s): Occurence of pregnancy.
Result(s): Among patients exposed to embolization, 14 had been exposed to pregnancy and 12 had been pregnant. There was no statistically significant difference of occurrence of pregnancy between the nonembolized and embolized groups (P=.30).
Conclusion(s): According to the results, it seems that embolization does not alter subsequent fertility. This study nevertheless suggests a trend toward fewer pregnancies in the embolization group and reports three severe complications in that group. This trend deserves to be explored by further studies with higher statistical power. However, even if it would be difficult to provide complete reassurance to patients who have undergone embolization, better information regarding their subsequent fertility and potential risks could relieve them of their worries regarding a new pregnancy. (Fertil Steril® 2010;94:2574–9. ©2010 by American Society for Reproductive Medicine.)

Key Words: Embolization, uterine arteries, postpartum hemorrhage

Obstetrical hemorrhage is the most common cause of maternal mortality throughout the world (1–3) and is a significant cause of morbidity. This unpredictable event occurs in 5% of births and is severe in 1% of cases. It is a life-threatening condition in 1 out of 1,000 cases (1, 4). According to most studies, uterine atony is the most frequent cause, followed by genital tract tears (4). Abnormal implantation of the placenta is at the root of only 2% of cases, but these are more difficult to manage. In the majority of cases, obstetrical hemorrhage can be controlled with medical treatment: uterine exploration, examination of the genital tract, administration of oxytocins; if these treatments fail, prostaglandins like sulprostone can be used. However, if the hemorrhage persists, surgical treatment is necessary: vascular ligatures or hemostatic hysterectomy.

Embolization of the uterine arteries has emerged as an interesting alternative to surgical treatment for obstetrical hemorrhages that do not respond to medical treatment (5). It is an only slightly invasive technique with few adverse effects (6), and many authors have demonstrated its efficacy (7–12). Embolization has thus been established as a sound technique to control obstetrical hemorrhage.

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Absorbable materials are used in arterial embolization to control obstetrical hemorrhage; these materials temporarily occlude the blood vessels and theoretically protect against complications such as ovarian insufficiency and necrosis of the uterus. However, temporary occlusion and the inflammatory reaction related to the presence of embolization agents can potentially affect the endometrium and the menstrual cycle, with an impact on any subsequent pregnancies. The impact of embolization on fertility has not been studied in great detail. Some authors have examined the pregnancies and menstrual cycles that occur in patients who have undergone embolization, but these have been only descriptive studies with small patient numbers. The objective of the present study was, therefore, to obtain an accurate analysis of fertility after uterine artery embolization to treat obstetrical hemorrhage.

MATERIALS AND METHODS

This retrospective exposed-nonexposed cohort study was carried out in August 2007 at the University Hospital Center in Limoges, France, in the level 3 maternity unit. Each of the patients included gave her informed consent to participate in this study, which was approved by the local Ethics Committee.

Inclusion Criteria

We firstly identified all patients who underwent embolization between October 2000 and August 2006. These patients were contacted and informed about the study by mail including a questionnaire regarding their fertility. All patients who responded were included.

Using the birth registry in the maternity ward, each of the included embolized patients was paired with two women who had never undergone embolization.

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TABLE 1

Characteristics of the 53 embolized patients January 2000–June 2006.

Variable	
Age, y	34.3 (19–44)
Total no. of pregnancies	2.18 (1–8)
Parity	2.02 (1–5)
Spontaneous pregnancy	88.3% (53/60)
Medically assisted fertility	11.7% (7/60)
Single pregnancy	91% (48)
Twin pregnancy	9% (5)
Artificially induced labor	32% (17/53)
Length of labor	6 h 21 min (30 min–15 h)
Term, wk	
≥37	81.1% (43/53)
32–37	13.2% (7/53)
28–32	3.8% (2/53)
≤28	1.9% (1/53)
Vaginal delivery	54% (29/54)
With episiotomy	62% (18/29)
Extraction using instruments	28% (8/29)
Cesarean delivery	46% (25/54)
Active management of third stage of labor	21% (11/53)
Expectant management	11% (6/53)
Manual removal of the placenta	68% (36/53)
Etiology of the hemorrhage	
Uterine atony	81.1% (43/53)
Isolated	64.0% (34/53)
With another cause	17.0% (9/53)
Placenta accreta	9.4% (5/53)
Thrombus	3.8% (2/53)
Vascular damage	5.7% (3/53)
Embolization (n = 56)	
Unilateral	3.6% (2)
Bilateral	96.4% (54)
Embolized blood vessels (n = 56)	
Uterine arteries	66.0% (37)
Anterior trunk of the internal iliac	5.3% (3)
Vaginal arteries	3.7% (2)
Uterine and internal iliac arteries	8.9% (5)
Uterine, cervical and vaginal arteries	3.7% (2)
Uterine and vaginal arteries	1.8% (1)
Uterine, lumbar and ovarian arteries	5.3% (3)
Uterine arteries with arteriovenous malformation	5.3% (3)
Materials (n = 56)	
Absorbable gelatin	78.5% (44)
Coils	1.8% (1)
Microparticles	7.1% (4)
Gelatin + other (microparticles or coils or polyvinyl alcohol)	12.6% (7)
Total complications (n = 53)	35.9% (19)
Pain + fever	30.2% (16)
Hematoma/inguinal pain	5.7% (3)

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TABLE 1

Continued.

Variable	
Menstrual cycles (n = 53)	
Normal/unchanged	75.5% (40)
Metrorrhagia	3.8% (2)
Secondary amenorrhea	20.7% (11)
Absence due to contraception	15.1% (8/11)
Absence due to embolization	5.6% (3/11)
Desire to become pregnant	
Yes	26.4% (14)
No	73.6% (39)
Occurrence of pregnancy	14

Note: Values are represented as median (interquartile range) or percentage (frequency).

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The pairing criteria were: date of delivery (to have identical follow-up periods), age, parity, total number of pregnancies, whether the pregnancy was spontaneous or with fertility assistance, and mode of delivery. Those patients were contacted by phone and answered the same questions as patients of the embolization group. It was the same person that contacted patients of the two groups.

Questionnaire

The questionnaire contained 12 short questions dealing with: description of the menstrual cycle before and after delivery (with or without embolization), means of contraception used, desire to become pregnant and occurrence of pregnancy after embolization, spontaneous pregnancy or with medically assisted fertility techniques, and how the pregnancy progressed.

Statistical Analyses

Qualitative variables were described using frequency and percentage. Quantitative variables were described using mean and standard deviation. We performed a survival analysis of occurrence of pregnancy. Baseline time was time from delivery to date of pregnancy or censoring date (date last known not to be pregnant). Survival curves were performed using Kaplan-Meier method and compared using log-rank test. To take into account that an exposed woman was paired with two nonexposed women, we also used a stratified Cox proportional hazard model. Analyses were performed using SAS v9.0 (SAS Institute, Cary, NC). A P value of $<.05$ was considered to be statistically significant.

RESULTS

Included Population

Among the 60 women who underwent embolization, 53 responded to the questionnaire and were included in the study. They were paired with 106 women who did not undergo embolization.

Descriptive Analysis of the Embolization Group

Characteristics of the 53 patients who underwent embolization are summarized in Table 1. Fifty-four deliveries are described because a woman pregnant with twins gave birth normally for the first twin and by cesarean section for the second one. Uterine atony was the most frequent cause of obstetrical hemorrhage, with 43 cases (81.1%).

The primary efficacy of embolization was 94.3% (50 with initial success). In three patients, the second attempt at embolization was effective. Overall effectiveness of the technique was therefore 100%.

The results of the questionnaires answered by the 53 patients are summarized in Table 1. Since undergoing embolization, 40 patients