Failure of uterine fibroid embolization

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Objective: To assess the outcomes of patients who underwent uterine fibroid embolization (UFE) and to evaluate factors associated with failure of UFE.
Design: Retrospective study.
Setting: University teaching hospital.
Patient(s): Two hundred thirty-three consecutive patients who underwent UFE from November 1997 to February 2004.
Intervention(s): Uterine fibroid embolizations were performed by three interventional radiologists using 355–500-μ polyvinyl alcohol particles.
Main Outcome Measure(s): Hysterectomy rate, myomectomy rate, and repeat UFE rate.
Result(s): With a mean follow-up of 13 months, a total of 22 patients underwent surgery after UFE (9.4%); 16 had hysterectomies (6.9%), and 6 had myomectomies (2.6%). This included 3 patients who underwent repeat UFE and subsequently required surgical intervention. The mean ($\pm$ SEM) time interval between UFE and subsequent treatment was 12.5 $\pm$ 2.0 months. Among patients who required surgery, 13 (59.1%) presented with recurrent menorrhagia, and 5 (22.7%) complained of persistent abdominal pain. Histopathologic examination revelead concomitant findings of adenomyosis in 25% of hysterectomy specimens. Patients who failed UFE were more likely to have had a previous myomectomy (13% vs. 2.4%) and significant reduction in the uterine size 6 months after UFE (57.1% vs. 25.2%).
Conclusion(s): The overall failure rate of UFE is 9.4%. Failure is mainly due to persistent menorrhagia and abdominal pain. Shrinkage of the uterus after UFE does not necessarily correlate with long-term success of UFE. (Fertil Steril® 2006;85:30–5. ©2006 by American Society for Reproductive Medicine.)

Key Words: Uterine fibroid embolization, uterine artery embolization, fibroids, leiomyoma, menorrhagia, complications, polyvinyl alcohol, failure rate

Uterine fibroids are the most common tumors in the female genital tract, with an estimated prevalence of nearly 40% in women of reproductive age (1). Uterine fibroids can cause symptoms including abnormal uterine bleeding, pelvic pain, dyspareunia, pressure sensation, and gastrointestinal and genitourinary dysfunctions. Women with symptomatic fibroids often require surgery, such as hysterectomy or myomectomy (2). It has been estimated that up to one third of hysterectomies are performed for fibroid-related indications (3).

Uterine fibroid embolization (UFE) has become widespread in the treatment of fibroids. Since its introduction in 1995, it has gained in popularity as an effective and safe alternative to surgery for women with symptomatic uterine fibroids (4). More than 200 case reports and series on UFE have been published. The mean fibroid reduction is approximately 50%–60%, and menorrhagia and pressure symptoms improved in 90% of patients after 1 year (5, 6). The perioperative morbidity of UFE is approximately 5% (7).

To date, the long-term efficacy of UFE has not been well documented. Moreover, little is known about factors associated with long-term failure of UFE. On the basis of the currently available evidence, the American College of Obstetricians and Gynecologists cautioned that UFE provides good short-term improvement in bulk-related symptoms and a reduction in menstrual flow (8). Similarly, the Society of Obstetrics and Gynecology of Canada recommends that women should be informed about the lack of long-term data on UFE for symptomatic fibroids (9).

The purpose of our study was to assess the outcomes of patients who underwent UFE and to evaluate factors associated with failure of UFE.

MATERIALS AND METHODS

The study involved a retrospective review of 233 consecutive patients who underwent technically successful UFE for symptomatic uterine leiomyoma at McGill University Health Center from November 1997 to February 2004. We systematically reviewed individual patient charts, including ultrasonography, operative, and histopathology reports.

In our institution, UFE is offered as a treatment option for symptomatic uterine leiomyoma to patients who desire to avoid surgery and who have completed their families. All patients who underwent UFE were referred by gynecologists affiliated with the institution.

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Patients received routine gynecological follow-up assessment, including pelvic examination, Papanicolaou smear, and endometrial biopsies. The volume of the uterus, location and size of the dominant leiomyoma, endometrial thickness, and appearance of the adnexa were examined with 5-MHz transducer transvaginal or 3-MHz transabdominal ultrasound before UFE. Three-dimensional measurements of the uterus and dominant fibroids were obtained: long axis (D1) and the two orthogonal planes (D2 and D3). Uterine and dominant leiomyoma volumes were calculated with the formula for a prolate ellipse ($0.5233 \times D1 \times D2 \times D3$).

Patients were counseled by the gynecologists and the interventional radiologist about the possible risks and complications of, and alternatives to, this intervention. Informed consent was obtained from each patient.

UFE Technique and Follow-Up

Uterine fibroid embolization was performed as an outpatient procedure under conscious sedation by three experienced interventional radiologists. Uterine fibroid embolization was performed bilaterally with 355–500-μ polyvinyl alcohol particles (Boston Scientific, Natick, MA). For the period from November 2001 to February 2002, the endpoint of the embolization technique evolved from complete stasis to a persistent forward flow in the main uterine arteries, generally clearing in three heartbeats, as seen on contrast angiogram. As part of the follow-up protocol, transvaginal or transabdominal ultrasonography was performed at 3 and 6 months after the procedure, and patients were examined annually by their gynecologists.

Definition of Short-Term and Long-Term Failures

Uterine fibroid embolization failure was defined as persistent or recurrent bleeding, pain, or bulk symptoms requiring hysterectomy, myomectomy, or repeat UFE. Short-term failure included patients who required surgery or repeat procedure within 6 months after UFE. Long-term failure involved patients requiring surgery or UFE more than 6 months after UFE. Patients who underwent additional interventions were identified from the medical record and pathology departments.

Outcome Measures

The main outcome measures were the rates of hysterectomy, myomectomy, and repeat UFE. Others factors included in the data analysis were age, volume of the uterus and dominant leiomyoma, time interval of symptom recurrence, and operative and histopathologic findings.

Statistical Analysis

Data were analyzed with chi-square tests for categorical variables and Mann-Whitney tests for continuous variables. All tests were two sided, and a P value of $<.05$ was considered statistically significant.

TABLE 1

Age, history of previous myomectomy, and presenting symptoms.

Characteristic	Failure group (n = 22)	Asymptomatic group (n = 211)
Age (y)	44.9 ± 4.72	44.1 ± 4.54
Previous myomectomy	3 (14)[a]	5 (2)
Symptoms		
Menorrhagia	12 (50)	113 (53.6)
Abdominal distension	7 (32)	52 (25)
Abdominal/pelvic pain	3 (14)	35 (17)

Note: Data are presented as n (%) or mean ± SEM.
[a] $P < .05$ vs. asymptomatic group.

Huang. Uterine fibroid embolization. Fertil Steril 2006.

RESULTS

Of the total 233 patients, 211 became asymptomatic after UFE, whereas 22 others required surgical reinterventions (9.4%). The mean duration of follow-up was 13 months (range, 1–36 months). Three patients underwent repeat UFE (1.3%). However, all three patients subsequently underwent additional surgery for their persistent symptoms. Baseline characteristics and presenting symptoms of the patients are depicted in Table 1. Compared with the asymptomatic group, more patients in the failure group had previous myomectomy (13% vs. 2.5%, $P<.05$). In fact, three women in the failure group had undergone hysteroscopic myomectomy before embolization.

Volume Reduction After UFE

The mean volume of the uterus before and at 3 and 6 months after UFE was 531.5 cm^3, 449.9 cm^3, and 380.7 cm^3, respectively. The mean volume of the dominant fibroid before and at 3 and 6 months after UFE was 201.4 cm^3, 139.3 cm^3, and 121.39 cm^3, respectively. The overal reduction of the uterine volume was 28.4% at 6 months and of the dominant fibroid was 39.7%.

There were no significant differences in the uterine and dominant fibroid volumes before UFE and at 3 and at 6 months after UFE between the failure and asymptomatic groups (Table 2). Of interest, the uterine shrinkage at 6 months was significantly greater in the failure group than in the asymptomatic group (57.1% vs. 25.2%, $P<.05$).

Causes of UFE Failure

Three patients required a repeat UFE. Patient 1 underwent a second emblization treatment after 11 months because of