Objective: To describe a successful pregnancy after a change in configuration of the endometrial cavity after magnetic resonance imaging-guided focused ultrasound surgery (MRgFUS) for leiomyomas.

Design: Case report.

Setting: University hospital.

Patient: A 40-year-old woman with known leiomyomas and a history of secondary infertility.

Intervention: Magnetic resonance imaging-guided focused ultrasound surgery treatment of two intramural myomas, one with a significant submucosal component.

Main Outcome Measure: Change in configuration of the uterine cavity.

Result(s): A viable intrauterine pregnancy, with full-term uneventful labor and vaginal delivery.

Conclusion(s): Magnetic resonance imaging-guided focused ultrasound surgery changed the configuration of the endometrial cavity, and a subsequent pregnancy resulted in a term delivery. (Fertil Steril® 2007;xx:xxx. ©2007 by American Society for Reproductive Medicine.)

Key Words: MRgFUS, leiomyomas, fertility, pregnancy

Uterine leiomyomas (fibroids) affect approximately 25% of women of reproductive age (1). The association between fibroids and infertility has been documented when there is distortion of the endometrial cavity (2–5). With the advent of hysteroscopic myomectomy, when there is an intracavitary fibroid, the cavity can be normalized in a minimally invasive fashion, thus enhancing fertility (6, 7).

However, both large, nonhysteroscopically resectable submucosal fibroids and intramural fibroids abutting the cavity can also cause cavitary distortion. The impact of these types of myomas on infertility and early pregnancy loss is more controversial. In addition, because these fibroids require abdominal myomectomy, the advantages of normalizing the cavity are outweighed by the morbidity of the surgery.

We report on a case where treatment of two uterine fibroids by magnetic resonance imaging-guided focused ultrasound surgery (MRgFUS) resulted in normalization of the endometrial cavity, and possibly facilitated a subsequent pregnancy.

CASE REPORT
A 40-year-old woman with three full-term deliveries and a history of secondary infertility presented for treatment of symptomatic uterine fibroids. She had a history of leiomyomas for 10 years, and experienced both abnormally heavy menstrual bleeding and pelvic pressure.

In August 2003, she enrolled in a clinical trial of MRgFUS for treatment of uterine fibroid (8). She gave informed consent for the trial, and was deemed eligible for treatment. The protocol stated that women should have completed childbearing before undergoing this investigational procedure.

On preprocedure MRI with gadolinium, an enlarged uterus measuring $15.8 \times 8.3 \times 14.0$ cm was seen. Multiple myomas were identified, and the two myomas believed to be most responsible for her symptoms were targeted for treatment. Both of these leiomyomas were located anterior and left of the endometrial cavity, causing a deviation of the cavity to the right.

The larger fibroid was located superior and to the left of the endometrial cavity, and had a significant submucosal component. The latter caused considerable compression and distortion of the cavity. The smaller intramural myoma was located inferiorly (Fig. 1A, B).

In September 2003, the patient underwent an uncomplicated MRgFUS treatment. Posttreatment gadolinium MR images indicated thermal-induced necrosis in each treated fibroid.

At 6-month follow-up examination, the overall size of the uterus was unchanged, but both treated fibroids were smaller. At 1 year, the superior treated fibroid was further decreased in size, and the inferior one had stabilized. A marked change in the configuration of the uterine cavity was noted at this time (Fig. 1C, D).
In January 2005, a year and a half after treatment, the patient had a viable intrauterine pregnancy confirmed by first-trimester ultrasound. She experienced first-trimester vaginal bleeding until 16 weeks of gestation, and was diagnosed with diabetes mellitus type II. Because of advanced maternal age, she underwent an amniocentesis, which was normal. Ultrasounds were frequently repeated throughout the pregnancy and showed stable uterine fibroids and normal fetal development. At 39 gestational weeks, labor was induced. She gave birth to a full-term, 3,170-g boy in cephalic presentation after an uneventful labor and vaginal delivery.

**DISCUSSION**

The impact of intramural fibroids on fertility is a topic of controversy (5). However, several studies demonstrated a decrease in implantation rates in the presence of intramural...
fibroids but not subserosal fibroids (5,6). There are several biologically plausible mechanisms for this effect.

Leiomyomas may cause a mechanical barrier to implantation and placentation or may physically interfere with gamete transport, vascular structures, or fallopian-tube function. Alternatively, myomas alter molecular expression in the uterus, and may act via inflammatory modulators, angiogenic factors, or the local endocrine milieu (9–13).

The indication for treatment of leiomyoma in this patient was not to enhance fertility. However, if fertility had been her desire, then given two significant leiomyomas with a minimal intracavitary extent, most gynecological surgeons would not have attempted endoscopic resection with this uterus, and she would likely have faced abdominal myomectomy as her only fertility-sparing option.

Although abdominal myomectomy conserves the uterus, it is associated with risks such as bleeding, infection, and postoperative formation of adhesions (14). In rare cases, conversion to a hysterectomy is necessary. If a less morbid method were available for treatment of these intramural and nonhysteroscopically resectable submucosal fibroids, enhancement of fertility might result.

In this case, a full-term pregnancy and delivery occurred after a marked change in the configuration of the endometrial cavity as a result of MRgFUS, as evidenced by the appearance on MRI. This is the second reported pregnancy after MRgFUS, but the first with an associated conformational change of the endometrial cavity (15).

Currently, outside the United States, a trial is underway for patients with symptomatic uterine fibroids who would like to become pregnant after undergoing MRgFUS treatment. Future large, clinical studies need to assess the correlation between leiomyoma-induced infertility and preconception treatment with MRgFUS, and whether MRgFUS is associated with any risk factors for pregnancy and labor.

REFERENCES