

## PERINATAL/NEONATAL CASE PRESENTATION

# Successful term pregnancy following MR-guided focused ultrasound treatment of uterine leiomyoma

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**Objective:** Term vaginal delivery after magnetic resonance-guided focused ultrasound therapy (MRgFU) for symptomatic uterine leiomyoma.

**Study design:** A 38-year-old nulligravida underwent MRgFU treatment per study protocol for a solitary 9 × 10 × 10 cm uterine myoma and conceived 18 months following the procedure. She was counseled on the unknown implications of MRgFU during subsequent pregnancy. Myoma size increased significantly during gestation. At 39 weeks, she underwent indicated labor induction with vacuum-assisted vaginal delivery of a healthy male infant.

**Conclusion:** In one pregnancy following MRgFU, there were no associated antepartum or intrapartum obstetrical complications.  
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**Keywords:** leiomyomata; MRgFU; thermoablative; pregnancy

### Introduction

Magnetic resonance-guided focused ultrasound (MRgFU) is a novel non-invasive thermoablative technique for the treatment of symptomatic uterine leiomyomata. Food and Drug Administration (FDA) approval was initially granted on the condition candidates would have completed childbearing; however, despite this restriction, pregnancy has inevitably occurred. Currently, there is a single case report of pregnancy following treatment of focal uterine adenomyosis, a relatively uncommon indication for the procedure.<sup>1</sup> We report the first case of a spontaneous pregnancy and term delivery 27 months after MRgFU for a solitary large symptomatic uterine myoma.

### Case

A 38-year-old nulligravid patient presented to the Gynecology division with symptoms of urinary frequency, urgency and lower

back pain. On physical examination and imaging studies, she was discovered to have a single 9 × 10 × 10 cm uterine myoma. Options of observation, uterine artery embolization, MRgFU, myomectomy and hysterectomy were discussed, and she elected to participate in the initial clinical trial of MRgFU therapy. At the time of enrollment, she met all study inclusion criteria, including no future reproductive intent.

On pretreatment magnetic resonance imaging (MRI), a single right anterior-lateral fibroid was noted to measure 9.2 × 10.4 × 9.9 cm. She underwent therapeutic treatment using the InSightec ExAblate 2000 system (Haifa, Israel).<sup>2</sup> By 6 months following the procedure, she had experienced complete resolution of pretreatment urinary symptoms with significant improvement in pelvic and lumbosacral pain. Normal menstrual chronicity was unaffected. A repeat MRI showed the diameter of the myoma remained essentially unchanged at 9.4 cm (Figure 1). Inadvisability of future pregnancy was discussed.

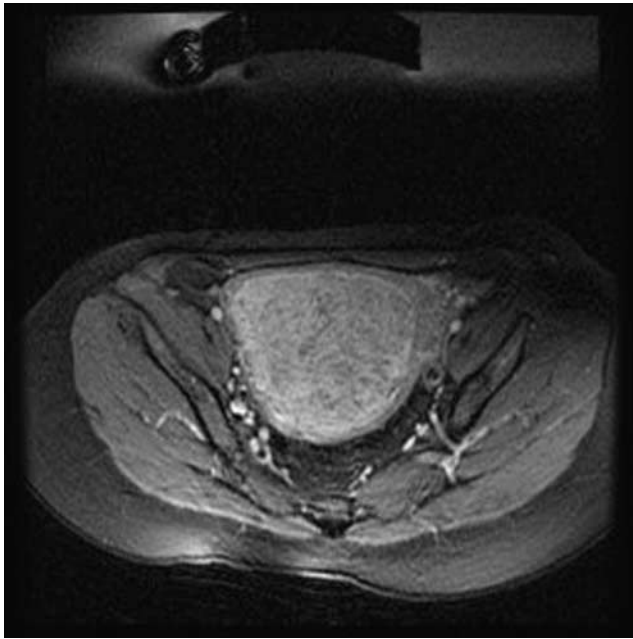
Eighteen months after completion of the study protocol, she spontaneously conceived. Early ultrasound confirmed a viable intrauterine fetus, with a significant increase in myoma size to 17 × 12 × 18 cm (Figure 2). She was again counseled regarding the unknown effects of MRgFU on myometrial tensile strength, and elected to continue the pregnancy. First-trimester screening returned with an elevated risk of aneuploidy, but she declined further evaluation. Serial sonography demonstrated appropriate interval fetal growth, and in the late second trimester she developed White's Class A2 gestational diabetes. An ultrasound at 37 weeks confirmed cephalic fetal presentation with myoma dimensions growing to 19 × 15 × 12 cm. The fetal head appeared to be presenting below the myoma, and vaginal delivery was cautiously deemed permissible (Figure 3). At 39 weeks, she underwent labor induction for gestational hypertension with vacuum-assisted vaginal delivery of a healthy non-anomalous male infant. Interestingly, the myoma was of such physical size to cause significant maternal abdominal wall disfigurement during second-stage expulsive efforts. Postpartum recovery of both mother and neonate was uneventful.

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**Figure 1** Post-treatment pelvic MRI showing uterine myoma.



**Figure 2** Transvaginal ultrasound of uterine myoma and gestational sac (GS) at 8 weeks gestation.



**Figure 3** Transabdominal ultrasound of uterine myoma and fetal head at 39 weeks gestation.

## Comment

Symptomatic uterine leiomyomata are relatively common during the later reproductive years and require treatment in approximately 25% of patients. Large uterine myomas may impair fetal presentation and position, myometrial contractility during labor and postpartum, and obstruct the progress of labor with consequent risk of uterine rupture. Traditional myomectomy or hysterectomy has in selected cases been superseded by progressive development of such minimally invasive options of hysteroscopic or laparoscopic myomectomy, uterine artery embolization and MRgFU.<sup>5</sup>

Focused ultrasound (FU), a non-invasive form of thermal tissue ablation, was first described in 1942.<sup>4</sup> Only in the last several years has the technique become sufficiently refined to permit delivery of precise and safe beam dosimetry. MRgFU for uterine leiomyomata was initially described in 2003, with preliminary series results reported by Stewart and co-workers in late 2004. Myoma volume was reduced by a mean of 13.5%, with significant improvement in quality of life at 6 and 12 months post-procedure. Intriguingly, volume reduction after the therapy is not essential for symptom resolution as the coagulation of angiogenic growth factors or alteration of internal myoma architecture may theoretically explain improvement in symptomatology. The non-invasive nature of the procedure holds particular attraction for candidates who intend subsequent conception without potential impairment of fertility.

Virtually no data are available to counsel patients on anticipated pregnancy complications and outcomes. A PubMed search from 1966 to present using search terms of 'MRgFU', 'leiomyoma' and 'thermoablative' revealed only a single reported case of pregnancy following MRgFU. Rabinovici and co-workers described a patient who underwent treatment for focal uterine adenomyosis with conception and successful vaginal delivery following the procedure. The current report is the first to address conception after treatment of a large uterine myoma, the most common indication for MRgFU. Although FDA guidelines for candidacy currently recommend against future pregnancy, inevitably some patients who undergo treatment shall eventually elect to conceive. Both case reports speak to the apparent safety of ensuing pregnancy, but with such limited data, it remains difficult to effectively counsel patients. Comparable minimally invasive techniques such as myolysis and uterine artery embolization have reported a higher incidence of abnormal placentation, cesarean delivery and uterine rupture.<sup>5,6</sup>

Owing to concern of labor dystocia and theoretical risk of uterine rupture, consideration was given in this pregnancy to primary cesarean delivery. However, as a tertiary obstetrical referral center, facilities and personnel to perform emergent delivery are continually available. Mode of delivery was discussed with the patient, and collectively a decision to attempt vaginal delivery was made.

Complication rates for pregnancies following MRgFU, optimal interval between treatment and conception, mode of delivery and incidence of uterine rupture to date remain undefined owing to a limited number of reported cases. Preliminary reports indicate pregnancy outcomes are favorable. This case reflects the emerging need for evaluation of the MRgFU effects on women desiring pregnancy.

## References

- 1 Rabinovici J, Inbar Y, Eylon SC, Schiff E, Hananel A, Freundlich D. Pregnancy and live birth after focused ultrasound surgery for symptomatic focal adenomyosis: a case report. *Hum Reprod* 2006; **21**: 1255–1259.
- 2 Stewart EA, Rabinovici J, Tempany CM, Inbar Y, Regan L, Gostout B *et al*. Clinical outcomes of focused ultrasound surgery for the treatment of uterine fibroids. *Fertil Steril* 2006; **85**: 22–29.
- 3 Fennessy FM, Tempany CM. MRI-guided focused ultrasound surgery of uterine leiomyomas. *Acad Radiol* 2005; **12**: 1158–1166.
- 4 Lynn JG, Zwemer RL. A new method for the generation and use of focused ultrasound in experimental biology. *J Gen Physiol* 1942; **26**: 179–193.
- 5 Bachmann G. Expanding treatment options for women with symptomatic uterine leiomyomas: timely medical breakthroughs. *Fertil Steril* 2006; **85**: 46–47.
- 6 Vilos GA, Daly LJ, Tse BM. Pregnancy outcome after laparoscopic electromyolysis. *J Am Assoc Gynecol Laparosc*. 1998; **5**: 289–292.