

Magnetic Resonance guided Focused Ultrasound Surgery (MRgFUS) with Interleaved Technique: Initial Experience for a more Rapid Treatment of Uterine fibroids.

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Objectives: MRgFUS is a technique that uses MRI to target, and control the noninvasive focused ultrasound thermal ablation of uterine fibroids. The purpose of this study was to evaluate a more rapid MRgFUS technique using a manual interleaved MRgFUS treatment of uterine fibroids that permits treatments to be done in less time or treatment of larger fibroids than the prior reported technique of MRgFUS.

Material and Methods: 38 MRgFUS treatments were performed in 28 pre or perimenopausal adult women aged 32-52 years old with symptomatic fibroids. 33 interleaved MRgFUS (iMRgFUS) treatments were performed in 23 of 28 patients.

Treatments were performed with an ExAblate 2000 (InSightec, Tirat Carmel, Israel) integrated into a Signa 1.5 Tesla MR scanner (LX Horizon, operating system 9x, General Electric Medical Systems, Waukesha, WI). MR T2 weighted fast spin echo images were performed in 3 cardinal imaging planes (4000-7000/95-102 msec TR/TE, 256x192, echo train 16, field of view 36 cm,). The treatment was manually plotted on the images with fibroid(s) divided into 2 or more separate non-overlapping regions. The intersonation cooling time was decreased from the default of 90 seconds to the minimum of 45-50 seconds. Each sonication was performed in 14-20 seconds and then monitored with an MR thermal map. The next sonication was selected from a separate region with no or minimal overlap. The number of sonications was noted. Each sonication was performed with 100-200 Watts over 14-20 seconds with 1.0-1.1 MHz. The parameters were titrated according to the thermal maps.

Results: The new technique permitted up to 127 sonications in a 3-hour treatment versus 60-70 sonications with prior technique in a 3-hour treatment. The same sized fibroid could be treated in about 60% of the time as the treatments using the former protocol. Alternatively, larger fibroid volume could be treated. There were no serious adverse events in patients who were treated with the iMRgFUS. 20 patients had 3 month follow up. 15 of these 20 patients were treated iMRgFUS. 14 patients had 6 month follow up with an MRI. Thirteen of the 15 patients had marked improvements in their symptom scores on the follow up visits. None of the 25 patients treated with iMRgFUS or MRgFUS have had alternative forms of treatment to date.

Discussion: This report of 33 iMRgFUS treatments in 23/28 patients suggests an apparently safe new method for a more rapid bloodless treatment of uterine fibroids with iMRgFUS. Spacing the locations of the sonications decreases or eliminates the overlap of the near and far fields of the sonication permitting shorter cooling period between sonications. This allows either a shorter duration of a fibroid treatment in about 60% of the time previously required or permits the treatment of greater fibroid volume.

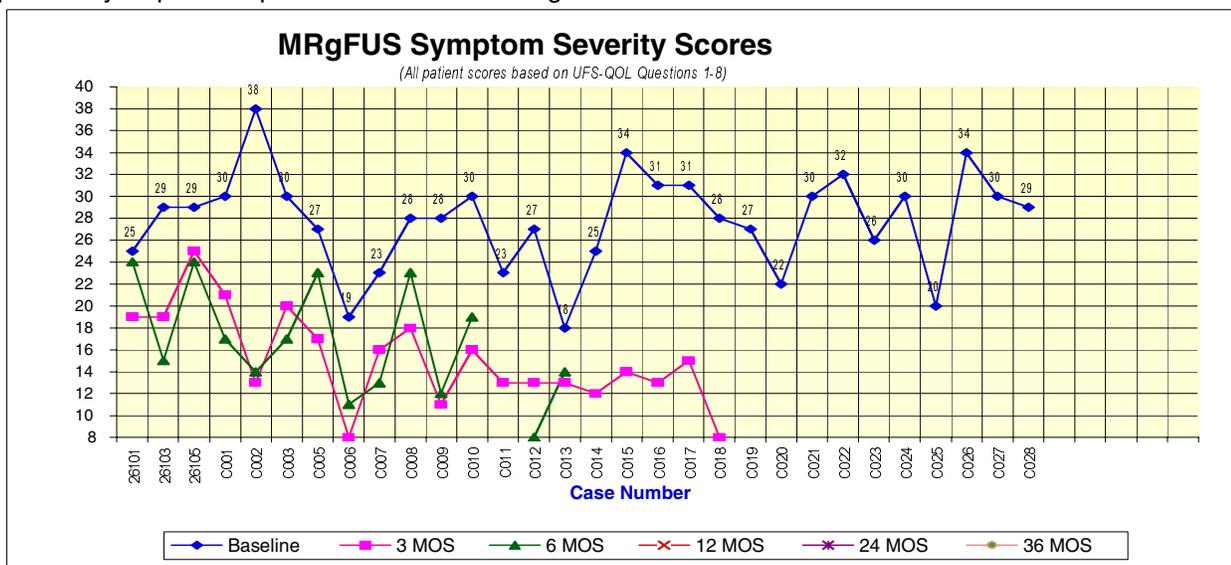


Figure 1. MRgFUS Symptoms severity scores on the patients enrolled and treated with MRgFUS. The baseline scores are circles and were obtained at the time of enrollment. Pink Square is the 3-month, and green triangles are the 6-month follow up response to the symptomatic questionnaire. The minimum score obtainable on the questionnaire is 8.